

ECON672
PROGRAM ANALYSIS AND EVALUATION

University of Maryland

Winter 2022

Syllabus (Version 11/21/2022)

Lecturer: Samuel Rowe

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Course meeting: Thursday 6:45-9:30pm, 1400 16th Street, NW, Suite 140.

There will be a 15-minute break at some point between 7:45 and 8:30

Office hours: Monday 5:30-6:30 pm, by appointment only via Zoom

Course pre-requisites: ECON 641; ECON 645 is a co- or prerequisite.

TA: Luis Jaramillo

TA Office Hours: Wednesday 5-6pm, by appointment only via Zoom

Course description: The objective of this course is to learn the tools that are used to evaluate the effectiveness of public policies. A tremendous amount of money is spent on program evaluations, and they are difficult to conduct successfully. We will discuss the economics and econometrics of program evaluation, focusing on both experimental and non-experimental methods used for causal inference. You will learn how to distinguish high from low quality evaluations. We will examine published evaluation research with the intent of showing how research does or does not lead to clear conclusions regarding program performance.

Course objectives:

Our program has 7 general learning outcomes for students:

- 1. Ability to understand, evaluate and analyze economic data**
- 2: Ability to understand and interpret statistical evidence from economic data**
- 3: Ability to apply empirical evidence to assessing economic arguments**
- 4: Ability to apply macroeconomic theories to policy discussions
- 5: Ability to apply microeconomic theories to policy discussions**
- 6: Ability to communicate economic ideas to a broader audience**
- 7: Ability to evaluate the effectiveness of policy programs using sound economic techniques**

The learning outcomes that pertain to this course are: 1, 2, 3, 5, 6, 7 More specifically, students will:

- Learn the basics of the economics and econometrics of program evaluation, with a focus on hands-on implementation of econometric methods using actual data. This will include an emphasis on applied econometric skills using Stata.
 - Critically review the evaluation literature via written comments, formal discussant presentations and general class discussion of published evaluation research with the aim of showing how the process of knowledge creation through research does or does not lead to clear conclusions regarding program effects
 - Critically evaluate how research is presented in the public domain (e.g., media) to be a better consumer of reported findings
 - Learn the basics of how the evaluation industry functions and how evaluations affect and are affected by policy.

Overlap and Distinction from ECON 645

There are several topics that overlap with ECON 645, such as instrument variables, fixed effects, 2-by-2 difference-in-differences, regression discontinuity. ECON 672 will take a bit deeper dive into these topics, along with other quasi-experiment estimators, such as propensity score matching, two-way fixed effects, synthetic control, etc., for the evaluation of policies and programs. We will be discussing the application of these estimators in the context of research, as well.

Course materials:

Official text: Cunningham, Scott 2021. *Causal Inference: The Mixtape*. Yale University Press

You will also be responsible for all of the journal articles that are listed in the syllabus accompanying lectures. These can be accessed through the library. If you need help obtaining electronic access to the articles, please let the TA know to provide assistance.

Recommended text: Angrist, Joshua and Jorn-Steffen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton.

Additional material can be found on ELMS or Github: <https://github.com/rowesamuel/ECON672>

Required Software: STATA

Laptop Computer Requirement: Completing some of this course's requirements will require a laptop computer (not a notebook or a tablet!) with at least 1 GB of RAM and at least 5 GB of free space available on the hard-drive. I recommend a laptop with at least a 13-inch screen and at least 4 GB of RAM. Screens smaller than 13 inches are probably not practical.

Purchasing Stata: Students in our program must purchase Stata. Stata offers different "flavors" and different lengths of licensing. Price varies according to these two factors. Stata/BE is the least expensive and sufficient version for your coursework. With a single-user license, you can install Stata on up to three computers. Description of all the flavors are given here: <http://www.stata.com/products/which-stata-is-right-for-me/>

There are two ways to obtain Stata: 1) Student Pricing and 2) Prof+Plan.

I recommend the student-pricing plan. Student Pricing offers additional options with lower prices. If you wish to buy a 6-month license (\$45 for Stata/BE), an annual license (\$94 for Stata/BE), or a perpetual license (\$225 for Stata/BE), you need to order it as a regular student using the following link:

<https://www.stata.com/order/new/edu/gradplans/student-pricing/>

The perpetual license does not expire and is the most cost effective option assuming that you will stay in the program for at least 15 months. There are also upgrade discounts provided to perpetual license holders. During the checkout process you will be asked to verify your "@umd.edu" email address.

You can obtain Stata through the Campus GradPlan/Stata Prof+Plan, in which University of Maryland, College Park is a participating institution. To benefit from the discounted prices, click on the link below and pick the Stata version you would like to buy. (Note: Disregard the warning at the top which states that you must be a faculty or staff member. That is not correct.)

<http://www.stata.com/order/new/edu/gradplans/campus-gradplan/>. Through the Campus GradPlan/Stata Prof+Plan you can buy either an annual (\$125 for Stata/BE) or a multiyear (\$198 for Stata/BE).

During the checkout process you will be asked to upload a copy of your student ID or another document as a proof of your enrollment.

Grading and Assignments (% of grade)

Online discussions: due weekly (10% total)

Problem sets: (20%)

Midterm Exam: (20%)

Empirical Project (20%)

Final Exam: (30%)

Details

Online Discussions: I will post a question or series of questions relevant to the course material every Friday evening. The discussion might cover an academic article, a newspaper article covering academic articles, or a published evaluation. The discussion will be open until Wednesday at midnight for you to comment/respond. I will check in to participate/respond/redirect. To fulfill this requirement, you may either create your own post in response to my original post, or write a substantive response to another student's post that contributes to the discussion. Each discussion session will be graded out of 10 points, with the following benchmarks:

- Participated in and furthered the discussion (10)
- Participated but did not contribute in a meaningful way (5)
- Late or unsubmitted (0)

Problem Sets: I will be assigning four problem sets to give practice for using real data to implement econometric evaluation estimators and how to interpret the results. It is expected for students to utilize the course material and implement the research designs. We will be following Dr. Scott Cunningham's Causal Inference: the Mixtape book, which provides code and data examples via Github: <https://github.com/scunning1975/mixtape>. Please utilize these resources to assist with completing the problem sets. For additional help, statalist.org, and [stackoverflow](http://stackoverflow.com) provide practical coding solutions to common problems.

Students may work together, but assignments must be original and submitted by each student. Problem sets should be submitted through via ELMS using the "Submit Assignment" button on the assignment's page. Please include all relevant files: 1) answers to the questions, 2) the well-organized and well-commented .do file, and 3) well-organized and well-commented log file. Please include your name, assignment number, date, and course number in a header comment at the beginning of each do file.

Each problem set will be graded out of 100 points

- Correct interpretation and implementation of code (100 points)
- Correct interpretation with minor coding errors (90 points)
- Minor misinterpretation with correct implementation of code (80 points)
- Misinterpretation with minor errors in implementation of code (60 points)
- Misinterpretation with major errors in implementation of code (25 points)
- Late or unsubmitted (0)

Empirical Project: Students will select a research question of their choosing that can be answered with a research method covered in this course. Student can choose whether to replicate an academic study or a government-sponsored evaluation, or pursue an original research question. Students will be awarded bonus points for successfully implementing original research given the additional work required. Students will need to select their idea by the deadline in the topics schedule. The topic idea submission needs to clearly explain the research question of interest and how the student initial plans to address the data and methodology.

Empirical project papers should be around 15-20 pages with double spacing. Additional graphs and tests can be added to an appendix. Students will present their empirical project to the class. If your project overlaps with another students, you will present together.

The empirical project should consist at least three major sections: 1) Introduction; 2) Data and Methods; and 3) Results. The introduction section must include a clear and concise research question of interest. It also needs to include a theory or background section that is applicable to the research question of interest. A literature review is optional, but if it is included it should be limited to 2-3 paragraphs. The data and methods section must include: 1) a discussion of the outcomes of interest; 2) treatment of interest; 3) descriptive statistics (mean, s.d., and observations) for outcomes and covariates of interest; 4) a discussion of the application of the quasi-experimental design methodology; and 5) a discussion of a directed acyclic graph. The results section should include: 1) your main results, 2) specification tests, and 3) assumption tests. Your main results should be the main takeaway from your empirical project. However, they need to be supported by specification tests and assumption tests. These tests will be a vital part of your work within your results section.

With replication studies, it is fine to cite the study and cite the literature within the studies, but your work (do files and paper) must be your own. For example, if a

replication study uses a logic model, you can add a directed acyclic graph to show the logic of the research design. The focus should be implementing the research design with the data utilized and correctly interpreting the results. Students should focus on observational studies instead of randomized control trials for replication studies.

Empirical projects will be graded out of 100 points:

- Clear, concise well-researched empirical project with clear research question, clear theory with applicable methodologies, and clearly well-explained interpretation of results (100 points)
- Empirical project with clear research question, good attempt to apply theory and methodology, mostly clear interpretation (90 points)
- Empirical project with clear research question, adequate attempt to apply theory and methodology, adequate attempt to interpret results (80 points)
- Empirical project with vague research question, adequate attempt to apply theory and methodology, vague interpretation of results (70 points)
- Poorly-researched empirical project that does not clearly state the research question, theory, methodology, and poor interpretation of results (50 points)
- Late or unsubmitted (0 points)

The research question can be a replication of completed studies (academic or government-sponsored evaluation) that provide public-use datasets, which can be implemented in STATA. Examples of completed government-sponsored evaluations with or without public-use data can be found here:

Examples:

A repository of replication studies (except Pathways paper): https://www.dropbox.com/sh/6d4zoblrq5bo19d/AABfbwnNIU9icKo8Gwq3_5Qda?dl=0.

Department of Labor Chief Evaluation Office: <https://www.dol.gov/agencies/oasp/evaluation/completedstudies>

DOL Employment and Training Administration Division of Research and Evaluation
<https://www.dol.gov/agencies/eta/research>

DOL Clearinghouse for Labor Research and Evaluation
<https://clear.dol.gov>

Department of Education: https://ies.ed.gov/ncee/projects/evaluation/evaluations_filter.asp

Department of Education What Works Clearinghouse

<https://ies.ed.gov/ncee/wwc/>

Health and Human Services Office for the Administration of Children and Families:

<https://www.acf.hhs.gov/opre/topic/administrative-data-research-and-improvement>

Department of Justice Research Statistics and Evaluations

<https://www.ojp.gov/topics/research-statistics-evaluation>

In addition, there are public-use datasets that can be utilized to answer original research questions, such as NBER-hosted Current Population Survey (<https://www.nber.org/research/data/current-population-survey-cps-data-nber>) or the public-use microdata from the American Community Survey (<https://www.census.gov/programs-surveys/acs/microdata.html>).

Midterm: The midterm will cover the topics from week 1 to week 5, which will include: potential outcomes, experimental research designs, causal designs, matching and propensity scores, instrumental variables, and fixed effects (within estimator).

Final: The final will cover the latter topics of the course from week 7 to week 11, which will include: regression discontinuity design, various topics on difference-in-difference, synthetic controls, and benefit-costs ratios/marginal value of public funds

Calculation of final grades: Exams and the empirical project will be graded out of 100 points each. The problem set grade will be computed as the average of your problem set grades. The discussion grade will be computed as the average of your discussion grades over the course. Your final numerical grade will be calculated by taking a weighted average of these grades. The online discussion component and problem sets are already computed as though weights have been applied to an assignment graded out of 100 points. As stated above, the online discussion has a 10% weight, the problem sets have a weight of 20%, the midterm exam has a 20% weight, the empirical project has a 20% weight, and the final exam has a 30% weight.

At the end of the term, every student will then have a numerical course grade between 0 and 100. Students who demonstrate clear mastery of course material will get A grades. Students who demonstrate a good understanding will get B+ grades. Students who demonstrate only partial understanding will get B grades. Students who do not demonstrate understanding of the core material will receive B-'s or below.

A	A-	B+	B	B-	C+	C	C-	D+	D	F
100	92	89	79	69	59	49	39	29	19	9
93	90	80	70	60	50	40	30	20	10	0

Topics Schedule:

Week	Date	Topic	Due Dates
Week 1	Thursday 12/1/22	Introduction to Program Evaluation	
Week 2	Thursday 12/8/22	Potential Outcomes Experimental Research Designs	
Week 3	Thursday 12/15/22	Directed Acyclic Graphs and Causal Diagrams Matching	Empirical Project Due
Week 4	Monday 12/19/22	Propensity Score Matching Instrumental Variables	
Week 5	Thursday 12/22/22	Instrumental Variables (cont) Fixed Effects (Within) Estimator	Problem Set 1 Due
	Thursday 12/29/22	Winter Break	
Week 6	Thursday 1/5/23	Midterm Regression Discontinuity Design	
Week 7	Thursday 1/12/23	Regression Discontinuity Design (cont)	Problem Set #2 Due

Week 8	Thursday 1/19/23	2-by-2 Difference-in-Differences Event Studies and Triple Difference	
Week 9	Thursday 1/26/23	Two-Way Fixed Effects Difference-in-Differences Bacon-Decomposition Theorem	Problem Set #3 Due
Week 10	Thursday 2/2/23	Synthetic Control Project Presentations #1	Empirical Projects Due
Week 11	Thursday 2/9/23	Marginal Value of Public Funds Project Presentations #2	Problem Set #4 Due
Week 12	Thursday 2/16/23	Final Exam	

Readings

Week 1:

Cunningham, S. (2021). Causal Inference: the Mixtape. Chapter 1: Introduction

Angrist, J.D. & Pischke, J.S. (2010). The credibility revolution in empirical economics: How better research design is taking the con out of econometrics. *Journal of Economic Perspectives*. 24(2), 3-30.

Abadie, A. & Cattaneo, M.D. (2018). Econometric methods for program evaluation. *Annual Review of Economics*. 10, 465-503.

Week 2:

Cunningham, S. (2021). Causal Inference: the Mixtape. Chapter 4: Potential Outcomes

Krueger, A.B. (1999). Experimental estimates of education production functions. *The Quarterly Journal of Economics*. 114(2), 497-532.

LaLonde, R.J. (1986). Evaluating the econometric evaluations of training programs with experimental data. *The American Economic Review*. 76(4), 604-620.

Week 3:

Cunningham, S. (2021). *Causal Inference: the Mixtape*. Chapter 3: Directed Acyclic Graphs and Chapter 5: Matching and Subclassification Part 1

Cook, T.D., Shadish, W.R., & Wong, V.C. (2008). Three conditions under which experiments and observational studies produce comparable causal estimates: New findings from within-study comparisons. *Journal of Policy Analysis and Management*. 27(4), 724-750.

Week 4:

Cunningham, S. (2021). *Causal Inference: the Mixtape*. Chapter 5: Matching and Subclassification Part 2 and Chapter 7: Instrumental Variables Part 1

Dehejia, R.H. & Wahba, S. (2002). Propensity-score matching methods for nonexperimental causal studies. *The Review of Economics and Statistics*. 84(1), 151-161.

Angrist, J.D. & Krueger, A.B. (1991). Does compulsory school attendance affect schooling and earnings? *The Quarterly Journal of Economics*. 106(4), 979-1014.

Week 5:

Cunningham, S. (2021). *Causal Inference: the Mixtape*. Chapter 7: Instrumental Variables and Chapter 8: Panel Data

Graddy, K. (2006). Markets: The Fulton fish market. *Journal of Economic Perspectives*. 20(2), 207-220.

Cornwell, C. & Rupert, P. (1997). Unobserved individual effects, marriage, and the earnings of young men. *Economic Inquiry*. 35(2), 1-8

Week 6:

Cunningham, S. (2021). *Causal Inference: the Mixtape*. Chapter 6: Regression Discontinuity Part 1

Imbens, G.W. & Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics*. 142(2), 615-635.

Jacob, R., Zhu, P, Somers, M.A., & Bloom, H. (2012). A practical guide to regression discontinuity. MDRC. Retrieved from: <https://www.mdrc.org/publication/practical-guide-regression-discontinuity>

Week 7:

Cunningham, S. (2021). Causal Inference: the Mixtape. Chapter 6: Regression Discontinuity Part 2

Card D., Dobkin, C., & Maestas, N. (2008). The impact of nearly universal insurance coverage on health care utilization: Evidence from Medicare. *American Economic Review*. 98(5), 2242-2258.

Hoekstra, M. (2009). The effect of attending the flagship state university on earnings: A discontinuity-based approach. *The Review of Economics and Statistics*. 91(4), 717-724.

Week 8:

Cunningham, S. (2021). Causal Inference: the Mixtape. Chapter 9: Difference-in-Differences Part 1

Miller, S., Johnson, N., & Wherry (2021). Medicaid and mortality: New evidence from linked survey and administrative data. NBER Working Paper 26081.

Conley, T.G. & Taber, C.R. (2011). Inference with “difference-in-differences” with a small number of policy changes. *The Review of Economics and Statistics*. 93(1), 113-125.

Week 9:

Cunningham, S. (2021). Causal Inference: the Mixtape. Chapter 9: Difference-in-Differences Part 2

Roth, J. Sant’Anna, P.H.C., Bilinski, A., & Poe, J. (2022). What is trending in the difference-in-differences: A synthesis of the recent econometric literature. Working Paper. Retrieved from: <http://arxiv-export3.library.cornell.edu/abs/2201.01194v2>

Week 10:

Cunningham, S. (2021). Causal Inference: the Mixtape. Chapter 10: Synthetic Control

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effects of California’s tobacco control program. *Journal of American Statistical Association*. 105(490), 493-505.

Week 11:

Hendren N. & Sprung-Keyser B. (2020). A unified welfare analysis of government policies. *Quarterly Journal of Economics*. 135(3), 1209-1318

If time allows: Somers, M.A., Zhu, P., Jacob, R., & Bloom, H. (2013). The validity and precision of comparative interrupted time series and difference-in-differences in educational evaluation. MDRC Working Paper. Retrieved from: <https://files.eric.ed.gov/fulltext/ED545459.pdf>

Other Standard Policies for the Program and the University of Maryland

Policies related to all graduate courses at the University of Maryland are posted on this page of the Graduate School's website:

<https://gradschool.umd.edu/faculty-and-staff/course-related-policies>

Please familiarize yourself with these policies related academic integrity, non-discrimination policy, accessibility, absences and accommodations, grading, academic standing, grievance procedures, and other important policies.

Email: The University has adopted email as the primary means of communication outside the classroom, and I will use it to inform you of important announcements. The University creates an "@umd.edu" email address for every graduate student. All official UMD communications will be sent to students at their "@umd.edu" email address. You are responsible for reading your @umd.edu email address, including ELMS/Canvas Announcements I send to the class. You should make sure ELMS/Canvas announcements and messages are forwarded to an email address that you check regularly. Failure to check email, errors in forwarding email, and returned email due to "mailbox full" or "user unknown" will not excuse a student from missing announcements or deadlines. I will do my best to respond to email within 36 hours.

Course Website: Copies of the course syllabus, student's grades, and other relevant links and documents will be posted on the course's ELMS/Canvas website. Students can access the site via www.elms.umd.edu. They will need to use their University of Maryland "directory ID" and password.

Work Load: Mastering the material covered in this course requires a significant amount of work outside of class. Students should expect to spend more time outside of class than in class – typically at least twice as much time. The courses in our DC program are 12-week courses that cover all the same material as a traditional semester-long 3-credit

course (15 weeks). The compressed schedule makes it possible to complete our degree in just 15 months if you take 2 courses each term. But the compressed schedule also implies an accelerated pace with an average of 25% more work per week in a given course ($15/12 = 1.25$). The normal full-time load in a master's program is 3 courses per semester, or 6 courses per year. The weekly workload when taking 2 of our DC courses per term is equivalent to the load from 2.5 "normal" 15-week courses - so $2.5/3.0=83\%$ of a full-time load. However, the DC program takes just 1 week off between terms. Students who take 2 courses per quarter in our program complete 8 courses per year. So over the course of a year, taking 2 courses per quarter in our DC program is equivalent to 133% of a "normal" full-time load in the traditional semester-based program ($8/6 = 1.33$).

Academic Progress: The graduate school requires that students maintain a GPA of at least 3.0. Students whose cumulative GPA falls below 3.0 will be placed on academic probation by the graduate school. Students on academic probation must ask the program's director to petition the graduate school if they want to remain in the program. The petition must include a plan for getting the student's GPA up to at least 3.0. Students who do not live up to their plan can be forced to leave the program without having earned the degree. Note: a grade of "B" corresponds to a GPA of 3.0. A grade of "B-" corresponds to a GPA of 2.7.

Excused Absences: If you miss any class meetings for any reason, it is your responsibility to work with the instructor to make sure you catch up on the missed material. Instructors routinely facilitate things by posting lecture notes, etc. If you need to miss an exam or other graded course requirement because of illness, injury, or some other emergency: Follow doctor's orders and get documentation. Get in touch with the instructor as soon as you're able – preferably prior to missing the exam or deadline. Communicate with the instructor to make up the course requirement as soon as possible. You are entitled to recover before you make up the course requirement, but you are not entitled to extra days to study beyond the time the doctor's note says you're incapacitated. If you are incapacitated for more than a week or so beyond the end of the term, your grade in the course will be an "Incomplete". In such cases you must negotiate a plan with your instructor for completing the course requirements. Once you make up the course requirement the instructor will change your "I" to the appropriate letter grade.

School Closings and Delays: Information regarding official University closing and delays can be found on the campus website and the snow phone line: (301) 405-SNOW (405-7669). The program director will also announce cancellation information to the program as an announcement on the program's ELMS/Canvas site. This will generally

be done by 1:00 p.m. on days when weather or other factors are an issue. When classes need to be canceled during the semester, we make every effort to schedule makeup classes.

UMD Counseling Center: Sometimes students experience academic, personal and/or emotional distress. The UMD Counseling Center in Shoemaker Hall provides free, comprehensive, and confidential counseling / mental health services that promote personal, social, and academic success. All Counseling Center services are completely free for enrolled students. Proactively explore the range of services available at the Counseling Center, including the Counseling Service and Accessibility and Disability Service described at <http://www.counseling.umd.edu/>

Graduate Academic Counselor: The UMD Graduate School also has an academic counselor available to support students who are having difficulty navigating mental health resources on campus, are considering a leave of absence and/or need assistance finding mental health care off campus. The Graduate Academic Counselor also facilitates bi-weekly Graduate Student Circle Sessions which provide an opportunity to learn about resources and connect with other graduate students. Students can learn more about the Graduate Academic Counselor by going to: <https://gradschool.umd.edu/gradcounselor>

Course Evaluations: Near the end of the term, you will receive an email inviting you to submit a voluntary and anonymous course evaluation. Your feedback on courses will be very helpful in improving the quality of instruction in our program.

Building Access: There is a smartphone app that can be used to enter our building after normal business hours. The program coordinator will provide information about this. We will also provide information about the code for entering the front door of our suite. Please make sure you are receiving the ELMS-Announcements that we send out to the program about these and other important matters.

COVID Policies: Up-to date information about UMD COVID-19 policies and guidance are posted at

<https://umd.edu/4Maryland>

Given the evolving nature of the pandemic, the guidance and policies are subject to change. The plans are always coordinated with state and county health officials, with additional guidance provided by the University System of Maryland. The focus will always be on the health and well-being of our entire campus community.

We strongly urge all students, staff and faculty to read announcements they receive about COVID related guidance and policy, and to stay familiar with the information. We thank you all for your individual efforts to help protect the collective health of our entire community.