

# ECON 7335: Applied Econometrics

## Spring 2021 Course Syllabus

Mondays and Wednesdays 10:00-11:30am

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Instructor: **Professor Aimee Chin** (best way to contact me is by email: [achin@uh.edu](mailto:achin@uh.edu); some info about me here: [www.uh.edu/~achin](http://www.uh.edu/~achin))

Office: McElhinney Room 221B (but we will not hold meetings in my office this semester)

Office hours: Meetings can be arranged via email

TA: **Hoanh Le** (email: [hle21@uh.edu](mailto:hle21@uh.edu))

### Description

The purpose of this course is to expose students to some econometric techniques frequently used in applied microeconomic research. The course features critical reading of empirical research papers and the implementation of econometric methods using data sets.

### Learning Outcomes

- Students will attain, through lectures, readings and problem sets, knowledge about how to analyze quantitative data and how to draw inferences from statistical measures.
- Students will be able to critically assess empirical research, and to thoughtfully produce their own empirical research.

### Prerequisites

To take this course, you must have either: (1) passed Econometrics I (ECON 7331), or (2) received prior explicit permission from me.

### Summary Table of the Digital Tools for our Course

The digital tool	How we will use it
Microsoft Teams (part of UH Office 365)  Use the same Teams meeting link for all our class meetings unless I inform you otherwise	<ul style="list-style-type: none"><li>• To hold our online class meetings during our scheduled class time</li><li>• Audio rules: The default will be to have everyone muted and select unmute only while speaking.</li><li>• Video rules: For our class meeting for the final exam, you must keep your video on during the exam to ensure the academic integrity of exam administration. Your video is optional for our class meetings for lecture.</li></ul>
Blackboard Learn	<ul style="list-style-type: none"><li>• To get lecture slides</li><li>• To get problem set assignments and solutions</li></ul>
Stata	<ul style="list-style-type: none"><li>• The specific software we will use to implement the econometric methods we are learning</li><li>• See below for details about this software</li></ul>
Microsoft Word (part of UH Office 365)	<ul style="list-style-type: none"><li>• To type your responses directly into Word file containing questions for problem sets or exams</li><li>• You will email saved Word file containing your responses to me to be graded</li></ul>

Note: I do not regularly monitor voice/text messages sent to me via phone, voicemail, Blackboard, or Teams. If you need to contact me, please send me an email ([achin@uh.edu](mailto:achin@uh.edu)).

## Textbooks

There are two required books:

- 1) Jeffrey M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press, 2010 (Second Edition).
- 2) Joshua D. Angrist and Jorn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2009. [There is only one edition, however new copies contain some corrections to the original version (the book's website <http://www.mostlyharmlesseconometrics.com/> lists some errata under the Blog page, Corrections tab) so I recommend buying a new copy corrected for the errata. The data and commands used to produce the tables shown in the book are available here: <http://economics.mit.edu/faculty/angrist/data1/mhe.>]

The following book is recommended:

- 3) Joshua D. Angrist and Jorn-Steffen Pischke, *Mastering 'Metrics: The Path from Cause to Effect*, Princeton University Press, 2015. [The book's website <http://masteringmetrics.com/resources/> contains the data and commands used to produce the tables shown in the book.]

In addition to textbook readings, there will be journal article and working paper readings required for this course. Journal articles can be obtained through UH Libraries by searching journal titles (<http://info.lib.uh.edu/>), accessing the electronic version of the journal, then locating the specific article. For working papers on the reading list, I will typically provide the URL.

## Data Analysis Software

We will be using Stata, a statistical analysis software used widely by academics and policy analysts. Public versions of Stata are available at selected locations on UH campus including your computer lab and the library (on library computers, or remotely via the library's virtual software; see for info: <https://libraries.uh.edu/spaces-tech/software/virtual/>), but I recommend that you purchase your own copy. UH has an agreement with Stata Corp. called "GradPlan" which allows students to purchase its software at reduced rates; see <http://www.stata.com/order/new/edu/gradplans/student-pricing/>. For the purposes of our course, you can buy Stata/IC 16 six-month license which costs \$48. If you have an older version of Stata already, that is fine to use for our course.

## Requirements and Grading

1) problem sets	Approximately every 1-2 weeks	50%
2) final exam	Friday May 7 11:00am-2:00pm	35%
3) class participation	Combination of attendance, preparedness for class and quality of classroom comments	15%

**Problem Sets:** Problem set assignments will be posted on UH Blackboard Learn (go to <http://www.uh.edu/blackboard/> and click on the "Log In Here: Blackboard Learn" button). Some will involve data exercises. For the data exercises, we will use Stata. Students are permitted and encouraged to work together on problem sets. However, unless I state otherwise, each student must write up his/her own problem set—no copies will be accepted, and this includes programs.

Generally, you get a score of zero when you do not submit your problem set by the deadline, but in certain situations a deadline extension is possible; email me to make a request for a deadline extension for a specific problem set and state your reason for the request, and I will respond.

**Final Exam:** This will cover all the material of the course. It will be a closed-book exam; you may not consult your notes, the textbooks, the papers or any other resources—online or offline—during the exam. Your exam responses must be your own individual work; you are not allowed to work on exams with others in any way, and this includes but is not limited to helping others, receiving help from others, working together and sharing responses. Note that the exam will be administered during a Teams class meeting, and you must keep your video on with your face visible during the entire exam to ensure the academic integrity of exam administration.

Generally, you get a score of zero when you miss the exam, but in certain situations a make-up exam is possible; email me immediately if you expect to miss the exam or have missed the exam and state your reason for missing it, and I will respond.

**Class Participation:** Students are expected to attend every lecture, and participate in lecture, subject to the Excused Absence Policy described below. Some lectures will have short assignments, and performance on those short assignments is part of the class participation grade. If you miss a lecture, it is your responsibility to learn the material missed and complete any assignments assigned.

There may be possible disruptions to student schedules due to the COVID-19 pandemic, and to mitigate harm from such disruptions my plan is to record our lectures. A link to each lecture's video will be available in Microsoft Teams under the team icon for our class ("ECON 7335 Chin Spring 2021"; clicking on the link will take you to a Microsoft Stream video; all the videos for our class will be posted under our class group in Microsoft Stream). In the case of a missed lecture, the student is advised to review the lecture slides, video recording and readings associated with the missed lecture.

**Optional Research Seminars:** I encourage you to attend the University of Houston Empirical Microeconomics Workshop, a weekly seminar series featuring leading researchers in applied microeconomics. This semester, all the seminars are virtual, and are Tuesdays 4:00-5:15pm or Fridays 10:00-11:15am (see <http://www.uh.edu/~achin/workshop/> for the schedule of speakers). Though seminar attendance is not counted in your grade for this class, attending seminars is an excellent way to expose yourself to current research, learn what a research paper comprises, and learn how to give oral presentations.

## General Policies

- *Our Class Meetings:* Lectures will begin at 10:00am and end at 11:20am. We will meet every Monday and Wednesday between January 20 and May 3, except for March 15 and 17 (week of spring break).
- *Academic Honesty:* To cultivate an environment of academic integrity, the University of Houston expects students to abide by the University's Academic Honesty Policy, found in the Graduate Catalog (<http://www.uh.edu/academic-honesty-graduate>).

- *Student Code of Conduct:* Students are expected to abide by the University of Houston's Student Code of Conduct (<http://www.uh.edu/dos/behavior-conduct/student-code-of-conduct/>).
- *Sexual Misconduct Policy:* In accordance with the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. More information can be found on the Title IX website at <https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>.
- *Students with Disabilities:* The College of Liberal Arts and Social Sciences, in accordance with 504/ADA guidelines, is committed to providing reasonable academic accommodations to students who request them. Students seeking accommodation must register with the [Center for Students with DisABILITIES](https://uh.edu/csd/) (CSD; <https://uh.edu/csd/>) and present approved documentation to me as soon as possible. I can make accommodations only if given advance notice.
- *Counseling and Psychological Services:* Counseling and Psychological Services (CAPS; [www.uh.edu/caps](http://www.uh.edu/caps)) is available for students having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS by calling 713-743-5454 during and after business hours for routine appointments or if you or somebody you know is in crisis. The "Let's Talk" program provides a drop-in consultation service at convenient locations and hours around campus (<https://uh.edu/caps/outreach/lets-talk/index.php#hours>).
- *Excused Absence Policy:* Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).
- *Recording of Class:* Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Center for Students with DisABILITIES](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's

recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with *anyone* without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

- *Syllabus Changes*: Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through email and on Blackboard Learn.

## Course Outline and Reading List (*subject to change*)

### 1. Introduction

Angrist and Pischke *Mostly Harmless Econometrics (MHE)* Chapter 1 / *Mastering 'Metrics* Introduction

Wooldridge, Chapters 1-4

### 2. The Selection Problem and Random Assignment

Angrist and Pischke *MHE* Chapter 2 / *Mastering 'Metrics* Chapter 1

Wooldridge, Chapter 21

Abadie, Alberto and Matias D. Cattaneo (2018). "Econometric Methods for Program Evaluation." *Annual Review of Economics* 10: 465-503. <https://economics.mit.edu/files/14922>

Gertler, Paul J., Sebastian Martinez, Patrick Premand, Laura Rawlings and Christel Vermeersch (2016). *Impact Evaluation in Practice*, Second Edition, World Bank. <http://hdl.handle.net/10986/25030>

Lalonde, Robert J. (1986). "Evaluating the Econometric Evaluations of Training Programs Using Experimental Data." *American Economic Review* 76(4): 604-620.

de Mel, Suresh, David McKenzie, and Christopher Woodruff (2008). "Returns to Capital in Microenterprises: Evidence from a Field Experiment." *Quarterly Journal of Economics* 123 (4): 1329-1372.

Finkelstein, Amy, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, Katherine Baicker, and the Oregon Health Study Group (2012). "The Oregon Health Insurance Experiment: Evidence from the First Year." *Quarterly Journal of Economics* 127(3): 1057-1106.

Dobbie, Will and Roland G. Fryer Jr. (2015). "The Medium-Term Impacts of High-Achieving Charter Schools." *Journal of Political Economy* 123(5): 985-1037.

Sacerdote, Bruce (2001). "Peer Effects with Random Assignment: Results for Dartmouth Roommates." *Quarterly Journal of Economics* 116(2):681-704.

Krueger, Alan B. (1999). "Experimental Estimates of Educational Production Functions." *Quarterly Journal of Economics* 114(2):497-532.

Chetty, Raj, John Friedman, Nathaniel Hilger, Emmanuel Saez, Diane Schanzenbach, and Danny Yagan (2011). "How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR." *Quarterly Journal of Economics* 126(4): 1593-1660.

Abhijit Banerjee, Esther Duflo, Nathanael Goldberg, Dean Karlan, Robert Osei, William Parienté, Jeremy Shapiro, Bram Thuysbaert, and Christopher Udry (2015). "A Multifaceted Program Causes Lasting Progress for the Very Poor: Evidence from Six Countries." *Science* 348(6236).

Kling JR, Liebman JB, Katz LF (2007). "Experimental Analysis of Neighborhood Effects." *Econometrica* 75(1): 83-119.

Anderson, Michael (2008). "Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects." *Journal of the American Statistical Association* 103(484): 1481-1495.

Lee, D. S. (2009). "Training, Wages, and Sample Selection: Estimating Sharp Bounds on Treatment Effects." *Review of Economic Studies* 76(3): 1071-1102.

Christensen, Garret, and Edward Miguel (2018). "Transparency, Reproducibility, and the Credibility of Economics Research." *Journal of Economic Literature* 56(3): 920-80.

### **3. Controlling for Confounding Variables (Regression, Matching)**

Angrist and Pischke *MHE* Chapter 3 / *Mastering Metrics* Chapter 2

Wooldridge, Chapters 21.3

Rosenbaum, Paul R., and Donald B. Rubin (1983). "The Central Role of the Propensity Score in Observational Studies for Causal Effects." *Biometrika* 70(1): 41-55.

Angrist, Joshua D. (1998). "Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants." *Econometrica* 66(2): 249-288.

Dehejia, Rajeev H. and Sadek Wahba (1999). "Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs." *Journal of the American Statistical Association* 94(448): 1053-1062.

Imbens, Guido W. (2015). "Matching Methods in Practice: Three Examples." *Journal of Human Resources* 50(2): 373-419.

Abadie, Alberto and Guido W. Imbens (2016). "Matching on the Estimated Propensity Score." *Econometrica* 84(3): 781-807

#### 4. Panel Data and Difference-in-Differences

Angrist and Pischke *MHE* Chapter 5 and 8 / *Mastering Metrics* Chapter 5

Wooldridge Chapters 6.5, 10, 11

Hallock, Kevin (1998). "Layoffs, Top Executive Pay, and Firm Performance." *American Economic Review* 88(4): 711-723.

Kinsler, Josh and Ronni Pavan (2015). "The Specificity of General Human Capital: Evidence from College Major Choice." *Journal of Labor Economics* 33(4): 933-972.

Currie, Janet and Duncan Thomas (1995). "Does Head Start Make a Difference?" *American Economic Review* 85(3): 341-364.

Ashenfelter, Orley and Cecilia Rouse (1998). "Income, Schooling and Ability: Evidence from a New Sample of Twins." *Quarterly Journal of Economics* 113(1): 253-284.

Meyer, Bruce D., W. Kip Viscusi and David L. Durbin (1995). "Worker's Compensation and Injury Duration: Evidence from a Natural Experiment." *American Economic Review* 85(3): 322-340.

Card, David and Alan Krueger (1994). "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84(4): 772-793.

Draca, Mirko, Stephen Machin, and Robert Witt (2011). "Panic on the Streets of London: Police, Crime, and the July 2005 Terror Attacks." *American Economic Review* 101(5): 2157-81.

Dynarski, Susan M. (2003). "Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion." *American Economic Review* 93(1):279-288.

Duflo, Esther (2001). "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment." *American Economic Review* 91: 795-813.

Gruber, Jonathan (1994). "The Incidence of Mandated Maternity Benefits." *American Economic Review* 84(3): 622-641.

Bailey, Martha and Andrew Goodman-Bacon (2015). "The War on Poverty's Experiment in Public Medicine: Community Health Centers and the Mortality of Older Americans." *American Economic Review* 105(3): 1067-1104.

Goodman-Bacon, Andrew (2018). "Difference-in-Differences with Variation in Treatment Timing." NBER Working Paper No. 25018. (Use newer 2020 version on Andrew Goodman-Bacon's website.)

de Chaisemartin, Clément and Xavier D'Haultfoeuille. "Two-way Fixed Effects Estimators with Heterogeneous Treatment Effects." *American Economic Review* 110(9): 2964-2996.

Evans, William and Jeanne Ringel (1999). "Can Higher Cigarette Taxes Improve Birth Outcomes?" *Journal of Public Economics* 72(1): 135-154.

Bleakley, Hoyt (2007). "Disease and Development: Evidence from the Hookworm Eradication in the American South." *Quarterly Journal of Economics* 122(1): 73-117.

Chin, Aimee (2005). "Long-Run Labor Market Effects of Japanese-American Internment during World War II on Working-Age Male Internees." *Journal of Labor Economics* 23 (July): 491-525.

Bertrand, Marianne, Esther Duflo and Sendhil Mullainathan (2004). "How Much Should We Trust Difference-in-Differences Estimates?" *Quarterly Journal of Economics* 119(1):249-275.

Cameron, C. and D. Miller (2015). "A Practitioner's Guide to Cluster-Robust Inference." *Journal of Human Resources* 50(2): 317-372.

Abadie, Alberto, Susan Athey, Guido Imbens and Jeffrey Wooldridge (2017). "When Should You Adjust Standard Errors for Clustering?" NBER Working Paper No. 24003.  
<https://www.nber.org/papers/w24003>

Abadie, A. (2020). "Using Synthetic Controls: Feasibility, Data Requirements, and Methodological Aspects." Forthcoming in *Journal of Economic Literature*.  
<https://economics.mit.edu/files/17847>

Athey, Susan and Guido W. Imbens (2017). "The State of Applied Econometrics: Causality and Policy Evaluation." *Journal of Economic Perspectives* 31(2): 3-32.

## 5. Instrumental Variables

Angrist and Pischke *MHE* Chapter 4 / *Mastering Metrics* Chapter 3

Wooldridge Chapter 5, 21.4

Angrist, Joshua D., Guido W. Imbens and Donald B. Rubin (1996). "Identification of Causal Effects Using Instrumental Variables." *Journal of the American Statistical Association* 91(434): 444-455.

Guido W. Imbens and Joshua D. Angrist (1994). "Identification and Estimation of Local Average Treatment Effects." *Econometrica* 62(2): 467-475.



Angrist, Joshua D. and Alan B. Krueger (2001). "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments." *Journal of Economic Perspectives* 13(2): 69-85.

Imbens, Guido (2014). "Instrumental Variables: An Econometrician's Perspective." *Statistical Science* 29(3): 323-358. <http://www.nber.org/papers/w19983>

Angrist, Joshua D. (1990). "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records." *American Economic Review* 80(3): 313-336. (Note Errata in December 1990 issue.)

Angrist, Joshua D. and Alan B. Krueger (1991). "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics* 106(4): 979-1014.

Bleakley, C. Hoyt and Aimee Chin (2004). "Language Skills and Earnings: Evidence from Childhood Immigrants" *Review of Economics and Statistics* 86(2): 481-496.

Goldsmith-Pinkham, Paul, Isaac Sorkin and Henry Swift (2019). "Bartik Instruments: What, When, Why, and How" *American Economic Review* 110(8): 2586-2624.

Adão, Rodrigo, Michal Kolesár and Eduardo Morales (2019). "Shift-Share Designs: Theory and Inference." *Quarterly Journal of Economics* 134(4): 1949-2010.

Jaeger, David, Joakim Ruist and Jan Stuhler (2018). "Shift-Share Instruments and the Impact of Immigration." NBER Working Paper No. 24285. <https://www.nber.org/papers/w24285>

## 6. Regression Discontinuity Designs

Angrist and Pischke *MHE* Chapter 6 / *Mastering Metrics* Chapter 4

Wooldridge Chapter 21.5

Lee, David S. and Thomas Lemieux (2010). "Regression Discontinuity Designs in Economics." *Journal of Economic Literature* 48(2): 281-355.

Imbens, Guido and Thomas Lemieux (2008). "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142(2): 615-635.

Carpenter, Christopher and Carlos Dobkin (2011). "The Minimum Legal Drinking Age and Public Health." *Journal of Economic Perspectives* 25(2): 133-156.

Hoekstra, Mark (2009). "The Effect of Attending the Flagship State University on Earnings: A Discontinuity-Based Approach." *Review of Economics and Statistics* 91(4): 717-724.

Zimmerman, Seth D. (2014). "The Returns to College Admission for Academically Marginal Students." *Journal of Labor Economics* 32(4): 711-754.

Angrist, Joshua D. and Victor Lavy (1999). "Using Maimonides' Rule to Estimate the Effects of Class Size on Scholastic Achievement." *Quarterly Journal of Economics* 114(2): 533-575.

Urqiola, Miguel and Eric Verhoogen (2009). "Class-size Caps, Sorting and the Regression-Discontinuity Design." *American Economic Review* 99(1): 179-215.

Almond, Douglas, Joseph Doyle, Amanda Kowalski and Heidi Williams (2010). "Estimating Marginal Returns to Medical Care: Evidence from At-risk Newborns." *Quarterly Journal of Economics* 125(2): 591-634.

Barreca, Alan, Melanie Guldi, Jason Lindo and Glen Waddell (2011). "Saving Babies? Revisiting the Effect of Very Low Birth Weight Classification." *Quarterly Journal of Economics* 126(4): 2117-2123.

Bharadwaj, Prashant, Katrine Vellesen Loken and Christopher Neilson (2013). "Early Life Health Interventions and Academic Achievement." *American Economic Review* 103(5): 1862-91.

Black, Sandra (1999). "Do Better Schools Matter? Parental Valuation of Elementary Education?" *Quarterly Journal of Economics* 114(2): 577-599.

Imbens, Guido and Karthik Kalyanaraman (2012). "Optimal Bandwidth Choice for the Regression Discontinuity Estimator." *Review of Economic Studies* 79(3): 933-959.

Cattaneo, Matias D., Nicolas Idrobo, and Rocío Titiunik (2019). *A Practical Introduction to Regression Discontinuity Designs: Foundations. Elements in Quantitative and Computational Methods for the Social Sciences*, Cambridge University Press. (You can find copy on Matias Cattaneo's website.)

## 7. Regression Kink Designs

Nielsen, Helena, Torben Sorensen and Christopher Taber (2010). "Estimating the Effect of a Student Aid Program on College Enrollment: Evidence from a Government Grant Policy Reform?" *American Economic Journal: Economic Policy* 2(2): 185-215.

Lundqvist, Heléne, Matz Dahlberg and Eva Mörk (2014). "Stimulating Local Public Employment: Do General Grants Work?" *American Economic Journal: Economic Policy* 6(1): 167-192.

Manoli, Day and Nicholas Turner (2018). "Cash-on-Hand and College Enrollment: Evidence from Population Tax Data and Policy Nonlinearities." *American Economic Journal: Economic Policy* 10(2): 242-71.

Card, David, David Lee, Zhuan Pei and Andrea Weber (2015). "Inference on Causal Effects in a Generalized Regression Kink Design." *Econometrica* 83(6): 2453-2483.