

ECO 395M – Causal Inference

Spring 2023

Mon./Wed., 9:30am – 11:00am

BRB 1.118

Instructor: Prof. Cody Tuttle

Email Address: cody.tuttle@utexas.edu

Course Website: Canvas

I. Course Description

Overview: The objective of this course is to introduce you to how economists infer causality from data. Researchers, policymakers, businesses, and the general public are often interested in knowing the effect of some policy or event on some outcome. Economists employ a variety of methods to estimate those effects. This course will cover those methods in detail. Topics include: the potential outcomes causal model, randomized controlled trials, regression discontinuity design, regression kink design, instrumental variables, and difference-in-differences.

Format: This is an advanced course in econometrics. The course will consist of lectures and discussions of topics related to causal inference and empirical research in economics. Since this course is focused on applied methods, you will often be asked to: (1) read and discuss applications of these methods from academic journal articles and (2) apply these methods yourself in problem sets. Throughout the semester, you will complete three exams or one exam and a research project. There will also be several reading quizzes.

II. Website & Course Communications

Canvas: All homework assignments must be submitted on Canvas. I will also use Canvas to distribute course materials, to send important messages or notifications about class, and to post grades. It is your responsibility to check Canvas regularly and/or to make sure that your personal settings in Canvas correctly route messages to your preferred email address.

Before our next class meeting on **01/11** please check that you have access to this class on Canvas. If you do not have access, please email me to let me know **and** contact ITS Help Desk. They are open Monday-Friday, 9am to 4pm, and their contact information can be found here: <https://it.utexas.edu/>.

Email: You can contact me on Canvas or by using my email address cody.tuttle@utexas.edu. In general, I will try to respond to emails within 24 hours on Monday-Friday and within 48 hours over the weekend. **For questions related to problem sets**, please email the course TA and copy me. The TA will aim to respond within 24 hours on Monday-Friday. If the TA cannot respond in that time frame, they will let me know and I'll respond to your email.

III. Textbook and Course Readings

The textbook for this course is **Causal Inference: The Mixtape** by Scott Cunningham. Dr. Cunningham provides a **free online version** of this textbook here: <https://mixtape.scunning.com/>. If you prefer a hard copy of the book, you can purchase one for about \$35 dollars from Amazon or Yale University Press.

In addition to the textbook, we will read articles from academic research journals or popular news outlets. Any non-textbook readings will be distributed via Canvas.

IV. Software

You should use Stata for the problem set exercises. You have several options for accessing Stata.

1. Stata is available via a remote server that is operated by the Division of Statistics and Data Sciences. <https://wikis.utexas.edu/display/MSBTech/Configuring+a+Remote+Desktop+Connection+for+the+Stat+Apps+Server>.
2. Stata is installed in several campus labs. A list of lab locations and Stata availability is maintained here: <https://wikis.utexas.edu/display/ATS/Access+to+Statistics+Software>.
3. Stata can be purchased for six months (or longer) through the Stata website. The Stata/IC version is sufficient for all exercises in this course. See: <https://www.stata.com/order/new/edu/gradplans/student-pricing/>.

Stata tips: The quickest way to get help with a specific Stata command is to type *help [command]* into Stata and hit enter or press run. This will bring up a help file that describes what the command does and how to use it. If you need more information, you can also try clicking the link at the top of the help file titled "View complete PDF manual entry." Additionally, UCLA maintains a useful resource that covers several common Stata commands: <https://stats.idre.ucla.edu/stata/>. The textbook used in this course will also include Stata coding examples. Finally, it's often helpful to just Google "how to [x] in Stata." Some common websites that will come up are Stack Overflow and StataList.

V. Course Assignments and Grading

Reading Quizzes (10%): There will be eleven short reading quizzes throughout the semester. Only your ten best reading quizzes will be used in the calculation of your final grade. This means that your top ten quizzes will each be worth 1% of your grade.

Approved absences: If you experience one of the critical situations or emergencies listed here: <https://deanofstudents.utexas.edu/emergency/absencenotificationrequest.php> and are absent on the day of a reading quiz as a result, please contact me within 72 hours of the missed class. The missed quiz will be dropped from your grade and all other reading quizzes will be re-weighted accordingly such that they still combine to 10% of your grade. Per University policy, I may ask for an absence notification to verify the absence. **If you do not have an approved absence for missing the quiz, you will receive a zero.**

Problem Sets (30%): There will be five problem sets throughout the semester. Only your four best problem sets will be used in the calculation of your final grade. This means that your top four problem sets will each be worth 7.5% of your grade.

Collaboration: You are welcome to work on the problem sets with your classmates. You must write and turn in your own solutions. It is considered cheating to copy another student's work or any other source. You must also list the names of all classmates with whom you collaborated. You won't be penalized for working together. The heading of each problem set should contain your name, your student ID number, the course number, and the names of your collaborators. If you do work with your classmates, I strongly encourage you to be very cognizant of whether you are learning and understanding the material. The problem sets are designed to help you learn and prepare for the exams.

Late homework: Problem sets are due at 5pm CT on the due date. Late assignments will be subject to the following grade penalty schedule.

Lateness	Grade penalty
0-30 minutes late	No penalty
30 minutes-1 hour late	-1 point
1-24 hours late	-10 points
>24 hours late	-10 points + -1 additional points per each additional hour over 24 hours

Extensions: Everyone is allowed **two** homework extensions. To use an extension, you should let me know that you're using it before the assignment is due. When you use an extension on an assignment, it extends the due date for that assignment by 72 hours. After 72 hours, the above penalty schedule kicks in. You do not need to provide an explanation when using one of these extensions.

Approved absences: If you experience one of the critical situations or emergencies listed here: <https://deanofstudents.utexas.edu/emergency/absencenotificationrequest.php> and cannot complete an assignment on time as a result, please contact me before the assignment is due or within 72 hours of the due date. You will be given an opportunity to complete the missing assignment within a reasonable time. Per University policy, I may ask for absence notification to verify the absence.

Exam(s)/Research Paper (60%): You have a choice to complete (1) three exams or (2) one exam and an empirical research paper. The research paper must be completed with a partner. Please send me your choice via e-mail by 5pm on **01/20**. If you do not send me your choice by **01/20**, you will be automatically given the EXAMS-ONLY option. If you choose the EXAM+PAPER option, please also indicate who your co-

author will be on the research paper. If you would like to do the EXAM+PAPER option but cannot find a partner, email me and I will facilitate that matching process.

**** EXAMS-ONLY OPTION ****

Exams (60%): There will be three exams throughout the semester. Each exam is worth 20% of your grade. These exams will be held on: **02/15, 03/22, and 04/24.**

Approved absences: If you experience one of the critical situations or emergencies listed here: <https://deanofstudents.utexas.edu/emergency/absencenotificationrequest.php> and miss an exam as a result, please contact me within 72 hours of the exam date. The missed exam will be dropped from your grade and the other exams will be re-weighted accordingly such that they still combine to 60% of your grade. Per University policy, I may ask for an absence notification to verify the absence. **If you do not have an approved absence for missing the exam, you will receive a zero.**

Class attendance: You should regularly attend class because you'll be responsible for all the material covered in class. Attendance is not used for determining your grade, but if you miss class on the day of a reading quiz without an approved absence, you will receive a zero on the quiz.

Regrade requests: You have exactly one week from the date your graded assignment (i.e., problem set, quiz, or exam) is available for review to request a regrade. In order to request a regrade, you must submit a clear written statement explaining exactly which part of which problem was unfairly graded and why. If you alter your assignment in any way after it has been graded, that is considered cheating.

Religious holy days: By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an exam, or an assignment, in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable amount of time after the absence.

**** EXAM + PAPER OPTION ****

Exam (20%): There will be one exam worth 20% of your grade. This exam will be held on: **02/15.**

Approved absences: If you experience one of the critical situations or emergencies listed here: <https://deanofstudents.utexas.edu/emergency/absencenotificationrequest.php> and miss an exam as a result, please contact me within 72 hours of the exam date. The missed exam will be dropped from your grade and the other exams will be re-weighted accordingly such that they still combine to 60% of your grade. Per University policy, I may ask for an absence notification to verify the absence. **If you do not have an approved absence for missing the exam, you will receive a zero.**

Research Paper First Draft (20%): The research paper will be completed with a partner. A first draft of the research paper is due at 5pm on: **03/22.** I **highly recommend** you discuss your project with me before this date. I will provide rubrics for the first draft and final draft by 01/13.

Research Paper Final Draft (20%): A final draft of the research paper is due at 5pm on: **04/24.**

Class attendance: You should regularly attend class because you'll be responsible for all the material covered in class. Attendance is not used for determining your grade, but if you miss class on the day of a reading quiz without an approved absence, you will receive a zero on the quiz.

Regrade requests: You have exactly one week from the date your graded assignment (i.e., problem set, quiz, or exam) is available for review to request a regrade. In order to request a regrade, you must submit a clear written statement explaining exactly which part of which problem was unfairly graded and why. If you alter your assignment in any way after it has been graded, that is considered cheating.

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VI. Final Letter Grades

Final letter grades are assigned based on the weighted average of the assignments outlined above and your performance relative to the rest of the class.

Letter grades include: A, A-, B+, B, B-, C+, C, C-, D+, D, D-, and F.

As I hope you can see, flexibility is built into the assignments to support your success in this course. Consequently, the final grades are firm. To be fair to everyone, I must establish clear standards and apply them consistently, so please understand that being close to a letter grade cutoff is not the same thing as being on the cutoff (e.g, $89.999 \neq 90.000$).

VII. Academic Integrity

University of Texas Honor Code

The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Each student in this course is expected to abide by the University of Texas Honor Code. Any work submitted by a student in this course for academic credit will be the student's own work. For this course, collaboration is allowed on problem sets (see **Collaboration** policy above). Collaboration is also allowed with your partner for your empirical research project.

You are encouraged to study together and to discuss information and concepts covered in lecture with other students. However, this should never involve one student having possession of a copy (electronic or physical) of all or part of work done by someone else. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

During exams and quizzes, you must do your own work. Any collaborative behavior during the exams will result in failure of the exam and may lead to failure of the course and University disciplinary action.

Sharing of course materials: Sharing of course materials is prohibited. No materials used in this class, including but not limited to lecture handouts, videos, and assessments (quizzes, exams, homework assignments), may be shared online or with anyone outside of the class unless you have my explicit written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University of Texas Honor Code and an act of academic dishonesty. Any materials found online (e.g., on file sharing sites) that are associated with you will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including a failing grade.

VIII. Other Notices, Policies, and Resources

Statement on learning success: Your success in this class is important to me. We will all need to be adaptable because we all learn differently. If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course. I also encourage you to reach out to the student resources available through UT. Many are listed on this syllabus, but I am happy to connect you with a person or Center if you would like.

Accommodations for students with disabilities: This class respects and welcomes students of all backgrounds, identities, and abilities. If needed, you may request academic accommodations from Services for Students with Disabilities. Their contact information is as follows: website: <http://www.utexas.edu/diversity/ddce/ssd/>; voice phone: 512-471-6259; video phone: 1-866-329-3986. SSD accepts documentation of the disability and provides the student with letters for their instructors stating the appropriate accommodations. SSD also provides guidelines for informing instructors about needed accommodations. Please let me know of any accommodation(s) you will need as soon as possible. Even if you do not yet have your letter from SSD, please let me know if a letter is on its way. In order to receive an accommodation, I need either the letter, or knowledge that the letter is on its way, within the amount of time specified by SSD guidelines for informing instructors. In addition, please contact me as soon as possible if any of the material distributed in class is inaccessible.

University mental health services: Sometimes college students experience academic, personal, and/or emotional distress. The Counseling and Mental Health Center serves UT's diverse campus community by providing high quality, innovative and culturally informed mental health programs and services that enhance and support students' well-being, academic and life goals. Please note that most CMHC services are offered at no charge and that CMHC has a policy that students are never turned away due to inability to pay. You can find more information here: <https://cmhc.utexas.edu/index.html> or by calling 512-471-3515. If you are experiencing a mental health crisis, call the CMHC Crisis Line 24/7 at 512-471-2255.

The Sanger Learning Center: All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas. For more information, please visit <http://www.utexas.edu/ugs/slc> or call 512-471-3614.

BeVocal: BeVocal is a university-wide initiative to promote the idea that individual Longhorns have the power to prevent high-risk behavior and harm. At UT Austin, all Longhorns have the power to intervene and reduce harm. To learn more about BeVocal and how you can help to build a culture of care on campus, go to: <https://wellnessnetwork.utexas.edu/BeVocal>.

Behavior concerns: If you have concerns about the safety or behavior of fellow students, Tas or Professors, call BCAL (the Behavior Concerns Advice Line): 512-232-5050. Your call can be anonymous. If something doesn't feel right—it probably isn't. Trust your instincts and share your concerns.

Title IX reporting: Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, unprofessional or inappropriate conduct of a sexual nature, dating/domestic violence and stalking at federally funded educational institutions. UT Austin is committed to fostering a learning and working environment free from discrimination in all its forms. When unprofessional or inappropriate conduct of a sexual nature occurs in our community, the university can:

1. Intervene to prevent harmful behavior from continuing or escalating.
2. Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX investigation.
3. Investigate and discipline violations of the university's relevant policies.

Texas Senate Bill 212 requires all employees of Texas universities, including faculty, report any information to the Title IX Office regarding sexual harassment, sexual assault, dating violence and stalking that is disclosed to them. Texas law requires that all employees who witness or receive any information of this type (including, but not limited to, writing assignments, class discussions, or one-on-one conversations) must be reported. **I am a Responsible Employee and must report any Title IX related incidents that are disclosed in writing, discussion, or one-on-one.** Before talking with me, or with any faculty or staff member about a Title IX related incident, be sure to ask whether they are a responsible employee. If you would like to speak with someone who can provide support or remedies without making an official report to the university, please email advocate@austin.utexas.edu. For more information about reporting options and resources, visit <http://www.titleix.utexas.edu/>, contact the Title IX Office via email at titleix@austin.utexas.edu, or call 512-471-0419.

Religious holy days: By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, or an assignment, in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable amount of time after the absence.

Course drop policy: If you want to drop a course, please see the guidance here: <https://gradschool.utexas.edu/academics/policies/adding-and-dropping-courses>

Use of email for official correspondence to students: All students should become familiar with the University's official email student notification policy. It is the student's responsibility to keep the University informed as to changes in his or her email address. Students are expected to check email on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. It is recommended that email be checked daily, but at a minimum, twice per week. The complete text of this policy is available at: <https://it.utexas.edu/policies/university-electronic-mail-student-notification-policy>.

IX. Tentative Course Schedule

Note: This schedule is tentative and subject to change. I will communicate any changes clearly in advance.

M	D	W	Topic	Reading	Due Date Notes
1	09	1	Syllabus; Introduction to causal inference	—	—
1	11	1	Review of prob., stats, & linear regression	CI: Ch. 1, 2.1-2.24	—
1	16	2	***NO CLASS*** MLK Jr. Day	—	—
1	18	2	Review of prob., stats, & linear regression	CI: Ch. 2.24-2.27	—
1	23	3	Directed acyclic graphs	CI: Ch. 3	—
1	25	3	Potential outcomes causal model	CI: Ch. 4	—
1	30	4	Understanding data + working with data	Practice data exercise	—
2	01	4	Biased estimates; selection on observables	MHE 3.2	PSET #1 due 02/03
2	06	5	Applications of SOO	FM 2020; BFG 2020	—
2	08	5	Randomization (RCTs, etc.) + application	AS 2017	—
2	13	6	Review for Exam 1	—	—
2	15	6	EXAM 1	—	—
2	20	7	Regression discontinuity design	CI: Ch. 6.1-6.3	—
2	22	7	Application of RDD	Zimmerman 2014	PSET #2 due 02/24
2	27	8	Regression discontinuity design	Hansen 2015	—
3	01	8	Application of RDD	Deshpande 2016	—
3	06	9	Regression kink design + application	CI: Ch. 6.5; Turner 2017	—
3	08	9	Bunching + application	GM 2021; CTW 2019	PSET #3 due 03/10
3	13	10	***NO CLASS*** Spring break	—	—
3	15	10	***NO CLASS*** Spring break	—	—
3	20	11	Review for Exam 2	—	—
3	22	11	EXAM 2 or FIRST DRAFT	—	—
3	27	12	Instrumental variables	CI: 7-7.1, 7.2.1, 7.3-7.3.1, 7.6	—
3	29	12	Application of IV	MY 2017; MSVY 2013	PSET #4 due 03/31
4	03	13	Instrumental variables: judge leniency	CI: Ch. 7.8.2	—
4	05	13	Application of judge leniency IV	ADH 2021	—
4	10	14	Difference-in-differences	CI: Ch. 8.2, 9.1-9.5	—
4	12	14	Application of DiD + recent advances	MJW 2021, CI: Ch. 9.6-9.6.5	PSET #5 due 04/14
4	17	15	Machine learning	—	—
4	19	15	Review for Exam 3	—	—
4	24	16	EXAM 3 or FINAL DRAFT	—	—

Readings

CI: *Causal Inference: The Mixtape* by Scott Cunningham.

Practice data exercise: see handout on Canvas (will be posted week before 1/30 at latest)

MHE 3.2: *Mostly Harmless Econometrics*, Chapter 3.2 “Regression and Causality” by Josh Angrist and Jörn-Steffen Pischke

FM 2020: “Racial Divisions and Criminal Justice: Evidence from Southern State Courts” by Benjamin Feigenberg and Conrad Miller, *American Economic Journal: Economic Policy*, 2020.

BFG 2020: “Frontier Culture: The Roots and Persistence of ‘Rugged Individualism’ in the United States” by Samuel Bazzi, Martin Fiszbein, and Mesay Gebresilasse, *Econometrica*, 2020.

AS 2017: “Ban the Box, Criminal Records, and Racial Discrimination: A Field Experiment” by Amanda Agan and Sonja Starr, *Quarterly Journal of Economics*, 2017.

Hansen 2015: “Punishment and Deterrence: Evidence from Drunk Driving” by Benjamin Hansen, *American Economic Review*, 2015.

Zimmerman 2014: “The Returns to College Admission for Academically Marginal Students” by Seth D. Zimmerman, *Journal of Labor Economics*, 2014.

Deshpande 2016: “Does Welfare Inhibit Success? The Long-Term Effects of Removing Low-Income Youth from the Disability Rolls” by Manasi Deshpande, *American Economic Review*, 2016.

Turner 2017: “The Economic Incidence of Federal Student Grant Aid” by Lesley Turner, working paper, 2017.

GM 2021: “A Few Bad Apples? Racial Bias in Policing” by Felipe Goncalves and Steven Mello, *American Economic Review* (forthcoming), 2021.

CTW 2019: “Political Alignment, Attitudes toward Government and Tax Evasion” by Julie Berry Cullen, Nicholas Turner, and Ebonya Washington, *American Economic Journal: Economic Policy* (forthcoming), 2019.

MY 2017: “Bias in Cable News: Persuasion and Polarization” by Gregory Martin and Ali Yurukoglu, *American Economic Review*, 2017.

MSVY 2013: “Do Political Protests Matter? Evidence from the Tea Party Movement” by Andreas Madestam, Daniel Shoag, Stan Veuger, and David Yanagizawa-Drott, *Quarterly Journal of Economics*, 2013.

ADH 2021: “Misdemeanor Prosecution” by Amanda Agan, Jennifer Doleac, and Anna Harvey, working paper, 2021.

MJW 2021: “Medicaid and Mortality: New Evidence from Linked Survey and Administrative Data” by Sarah Miller, Norman Johnson, and Laura R. Wherry, *Quarterly Journal of Economics* (forthcoming), 2021.