

University of Colorado at Boulder
Department of Economics

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Website: Canvas
<https://canvas.colorado.edu/>

ECON 8848: Applied Microeconometrics, Spring 2022
Syllabus and Schedule

Office Hours: MW 1:00-2:30 PM
Economics 208D or

<https://cuboulder.zoom.us/my/briancadena>

Please use this link to schedule a specific time/location:
<https://calendly.com/brian-cadena/econ-8848-office-hours>

Course Description:

Students who are successful in this course will be well prepared to conduct empirical research across a broad range of fields, although the tools are used most frequently in the applied microeconomics fields. The course provides a “user’s guide” to many of the most commonly used econometric techniques, with a heavy focus on implementation and interpretation. We will begin the course with a STATA boot camp, quickly becoming familiar with the software package including programming techniques and data management skills. We will then move through a range of econometric topics, making sure to practice each technique in STATA.

To follow campus policy for Spring 2022, we will begin the semester in remote synchronous status for two weeks. We will meet via Zoom at the normally scheduled class time using the link on the Canvas website. **As per campus policy, this course will revert to in-person instruction when campus re-opens (currently scheduled for January 24, 2022). This course is not hybrid; there will not be a Zoom option when campus policy allows us to meet in person.**

Prerequisites:

To enroll in this course, you must have a working knowledge of statistics and econometrics equivalent to that obtained in ECON 7818 and ECON 7828.

Course Materials:

There is no required textbook for this course, although I will provide references to a number of books and articles for the interested student. We will also read and discuss several articles. Some of these articles will be “theory” articles, discussing the relative merits of estimators or developing and applying new ones. Others will be “application” papers, usually papers that use a technique we have discussed in an honest and useful way. I will also provide lecture notes, and you will find these and the assigned articles posted or linked on the Canvas website. You should read the articles assigned prior to coming to class and be prepared to answer questions and participate in discussions. Please bring a copy (paper or electronic) of the papers we are discussing with you to class.

Students are not required to purchase their own copies of Stata, although those desiring to do so qualify for a substantial student discount. More information is available through a link posted on the Canvas website. You may complete all of the exercises for this class using Stata/BE, although you may prefer to purchase a more powerful “flavor” (SE or MP) if you intend to use Stata for your work beyond this course.

I will use Stata during some lectures to demonstrate methods that we cover. If you have Stata installed on your computer, you may find it useful to have it open on those days, but I will provide the code through the course website for review after class.

Requirements and Grading:

Your grade will depend on your performance on a number of assignments, according to the table below:

| <u>Assignment</u> | <u>Weight</u> | <u>Due Date</u> |
|-----------------------------|---------------|--|
| Problem Sets | 15% | Every 1-2 weeks (~10 total) |
| Paper Replication/Extension | 30% | Tuesday 5/3 4:00 PM (Final exam slot) |
| First Midterm | 25% | Monday, 3/14 In Class (tentative date) |
| Second Midterm | 30% | Wednesday, 4/20 In Class |

Problem Sets will be posted on Canvas with deadlines every 1-2 weeks. These problem sets will allow you to gain direct experience with all of the econometric techniques we cover. All assignments will be Stata-based, although they will require answering interpretation/“thinking” questions as well. Five percentage points of your overall grade will be based on whether you complete the assignments and turn them in on time. I will also choose two assignments at random to grade in depth, and these grades will account for the remainder of your problem set grade. Note that the problem sets are fairly short and simple to start and become more difficult as we tackle more complicated material. You may work with other students on these assignments, and the code may be identical to other students’ submissions. To eliminate the temptation to free ride, each student must submit his/her own copy of the problem set (via Canvas), and you should indicate each of your collaborators on each problem set.

Each student must answer the “thinking/interpretation” questions separately, although you may discuss the answers with other students. It is expressly forbidden to copy and paste answers to these questions from another student, and any evidence that this occurred will result in a penalty of, at a minimum, zero credit for that assignment.

Paper Replication/Extension: Unlike the harder sciences, the field of economics has historically placed a relatively small weight on the value of replication (although this is changing somewhat). Nevertheless, economists make mistakes all the time, and some of them go undiscovered forever. So, as a means to practice all of the skills we are developing, and in service of the broader good, you will replicate the central analysis of a paper in a field that is of interest to you. You should choose a published paper that relies on publicly available data or on data that the authors have made available. The paper’s central methodology should be one of the methods we cover in this course. You must also provide at least one extension to the original work. Possible extensions include adding additional years of data, running additional specifications (e.g. functional form, synthetic control instead of DiD, etc.), and subjecting the results to additional robustness checks. Alternatively, you could use similar methods in a slightly different context – different geography, different time period, etc. An existing paper is not suitable as a replication paper if you cannot feasibly extend the paper. This assignment will function as our final exam. An electronic copy of this paper will therefore be due on Canvas by the end of our assigned time from the Registrar.

I will submit all final papers to TurnItIn. Note that although this assignment requires the replication of the central analysis from a published paper, **you may not borrow any language**

from the original paper without proper citation. I will require that you complete and attach the department's academic integrity cover sheet for the assignment.

<https://www.colorado.edu/economics/sites/default/files/attached-files/academicintegrityagreement.pdf>

The First Midterm will cover material from the beginning of the course through lecture on March 7. The exam will take place during a normal class meeting and is tentatively scheduled for March 14. You *will not* have to do any STATA programming for the midterm. Instead, the questions will focus on the interpretation and implementation of techniques we have discussed. The questions will thus be very similar to the interpretation questions asked on the problem sets. You may also be asked questions about the papers that we read.

The Second Midterm will be nominally cumulative, but it will focus heavily on material covered after the first midterm. It will be similar in format to the first midterm, and it will take place during our normal lecture time in the penultimate week of classes.

Final Letter Grades will be a weighted average of each of the components listed above. Prior to averaging, I will assign letter grades to each component based on the scores a good student at this level could reasonably be expected to attain.

Writing: Please note that this course requires a great deal of writing. The goal of the course is to prepare you to conduct and *to communicate about* original research in applied microeconomics. As you will soon find, the writing and communication components of applied econometrics are at least as important as the actual econometric skills. In grading papers, exams, and problem sets, I place substantial weight on students' ability to convey their understanding and interpretation of the methodologies and results. I do so in order to mirror the degree to which the discipline rewards these skills, especially in the job market process.

Seminar Series: You are strongly encouraged to attend the Economics department seminar series, especially when the speaker presents on an empirical applied micro topic. Learning to conduct and present original research is the key to your success in the discipline. These seminars are an excellent resource for you in that endeavor. You are also strongly encouraged to attend the applied micro brown bag series where students will present ongoing research that often uses the techniques we will be discussing.

Late Assignments/ Missed Examinations Policy: Problem Sets will be turned in through the Canvas website where they will receive a time stamp. Problem sets will be posted at least 10 days in advance, and each will be due on a Friday by midnight. Following a 5-minute grace period, I will assign zero credit toward the "completion" component of the Problem Set grade for any assignment turned in after the deadline. In the event that a late problem set is randomly selected to be graded in detail, I will deduct 1 point (out of 5) for each half day it is late, and assignments submitted more than 48 hours after the due date will receive no credit.

The paper replication must be turned in by the end of our assigned Final Exam time from the registrar.

There will be no make-up exams. If you have a conflict with an exam, please discuss the conflict as soon as possible. If you are unable to take an exam as scheduled, the missed exam will be given no weight in the calculation of the final grade and other assignments will be reweighted accordingly.

A note on my role: I am willing to offer you assistance with any assignment for this course, including the final paper. I will strongly suggest, however, that you form study groups for the problem sets and use the other members of your group as your initial resource in solving programming problems. I will not tell you how to solve specific coding issues on the problem sets, nor will I tell you whether you have answered interpretation questions properly prior to the due date. Solutions will be provided shortly after the deadline to turn in the assignment.

I generally cannot offer help on projects that are unrelated to this course, e.g. work you are doing as part of your dissertation or as an RA for other faculty members. My goal in offering this course is to create a critical mass of well-trained graduate students who can then continue to learn more on their own and then serve as a resource to each other. If I become an official member of your dissertation committee, however, I will be happy to meet with you and discuss your dissertation research.

Cheating: If you copy interpretation answers from a classmate (or previous student) on a problem set, you will receive no credit for that problem set. If you cheat on an exam, you will fail that exam. If you plagiarize even a portion of your final project, you will, at a minimum receive no credit for the copied portion. More than one past student has copied text directly from the paper they are replicating for the final project; if you do this, you will receive no credit for that portion of your work. I reserve the right to impose harsher academic sanctions up to and including failing the course for any instance of cheating. Also, note that failing any component of the course makes it very unlikely that you will earn a “B-” or better in the course.

Learning During a Global Pandemic:

The pandemic has affected and will continue to affect all of us in profound and unpredictable ways. This semester, I commit to offering empathy and flexibility to students enrolled in the class, and I ask that you offer me the same. I recognize that you are adjusting to taking (and teaching!) courses in multiple formats and that the sometimes unpredictable format switches present a challenge to all of us. I also recognize that things other than your coursework may have become higher priorities than usual. At times during the semester, you may need to attend to your own health care or care for loved ones. I am more than willing to be flexible and to find ways to support you. Please be in touch with me if you are struggling and let me know how I can help.

Some of you may have children at home without consistent childcare; know that I will welcome them in class, regardless of the mode of instruction we are currently operating in. I also have two elementary-school-aged children and my spouse and I both work full-time. Although I am hopeful that there will not be broad school closures, there is a chance that I may need to cancel class at the last moment due to a lack of childcare. While I will do my best to keep up normal response times to e-mail and to make myself available outside of regularly scheduled office hours and class meetings, I hope that you will extend some grace and patience to me this semester as well.

Tentative Schedule

| Topic | Tentative Dates |
|---|--|
| Introduction and STATA Basics | 1/10, 1/12 |
| No Class – MLK Day | 1/17 |
| Advanced STATA | |
| Programming – Loops, Macros | 1/19 |
| Linear Regression Review | |
| Functional Forms – Logs, Polynomials, Categorical Variables, Interaction Models | 1/24, 1/26 |
| Review of FWL and the meaning of “controlling for” | 1/31 |
| The Experimental Ideal | |
| Treatment Effects – Potential Outcomes Framework | 2/2 |
| Causality in an OLS Regression – the CIA | 2/7 |
| Propensity Score Methods | 2/9 |
| Advanced Data Management | 2/14 |
| Panel Data Models | |
| Difference-in-Differences style designs with a single treatment time, incl. Event Study and Synthetic control | 2/16, 2/21 - paper 2/23, 2/28 – paper |
| Difference-in-Differences with variable treatment timing | 3/2, 3/7 –paper |
| FIRST MIDTERM EXAM | 3/14 |
| Fixed Effects and First Differences | 3/9, 3/16 - paper |
| No Class – Spring Break | 3/21, 3/23 |
| No Class – exchange for project meetings 4/5 | 3/28 |
| Variance Estimation | 3/30 |
| Individual Project Meetings | 4/4, 4/5 |
| Instrumental Variables | |
| Basics – Constant Treatment Effects | 4/6 |
| Local Average Treatment Effects | 4/11, 4/13 – paper |
| Regression Discontinuity | 4/18, 4/25 – paper |
| SECOND MIDTERM EXAM | 4/20 |
| Wrap-Up | 4/27 |
| FINAL EXAM slot (Replication paper due) | Tuesday, 5/3 4:00 PM |

Additional Policies: This course is governed by additional policies covering all courses at CU Boulder. They are listed below for your reference.

CLASSROOM BEHAVIOR

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on [classroom behavior](#) and the [Student Conduct & Conflict Resolution policies](#).

REQUIREMENTS FOR COVID-19

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to [Student Conduct and Conflict Resolution](#). For more information, see the policy on [classroom behavior](#) and the [Student Code of Conduct](#). If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the “Accommodation for Disabilities” statement on this syllabus.

CU Boulder currently requires masks in classrooms and laboratories regardless of vaccination status. This requirement is a precaution to supplement CU Boulder’s COVID-19 vaccine requirement. Exemptions include individuals who cannot medically tolerate a face covering, as well as those who are hearing-impaired or otherwise disabled or who are communicating with someone who is hearing-impaired or otherwise disabled and where the ability to see the mouth is essential to communication. If you qualify for a mask-related accommodation, please follow the steps in the “Accommodation for Disabilities” statement on this syllabus. In addition, vaccinated instructional faculty who are engaged in an indoor instructional activity and are separated by at least 6 feet from the nearest person are exempt from wearing masks if they so choose.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the [Public Health Office](#) (contacttracing@colorado.edu). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the [Public Health Office](#) (contacttracing@colorado.edu). If you are unable to attend class due to illness, plan to get notes from a fellow classmate. You are not required to let me know that you will be missing class. If you expect to miss class for an extended period of time (e.g. isolation due to testing positive for

COVID-19), let me know and we can work out a way for you to catch up on the material you miss.

ACCOMMODATION FOR DISABILITIES

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

PREFERRED STUDENT NAMES AND PRONOUNS

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name. In this class, I will use whatever name or pronouns you prefer, even if they do not appear on the class roster. Please make me aware of your preferences if they differ from the roster.

HONOR CODE

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code academic integrity policy. Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu; 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the [Honor Code website](#).

SEXUAL MISCONDUCT, DISCRIMINATION, HARASSMENT AND/OR RELATED RETALIATION

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. The university will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-

2127 or email cureport@colorado.edu. Information about university policies, [reporting options](#), and the support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options. To learn more about reporting and support options for a variety of concerns, visit [Don't Ignore It](#).