## University of Colorado at Boulder Department of Economics

Prof. Brian Cadena brian.cadena@colorado.edu (303) 492-7908 Website: CULearn https://culearn.colorado.edu Economics 8848: Applied Microeconometrics, Fall 2009 Syllabus and Schedule Office Hours: MW 1:00-2:30 PM Economics 14A Other times by appointment

### **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. I hope to live up to the following quotation by Edward Leamer in his article *Let's Take the Con out of Econometrics* (AER, 1983):

"Methodology, like sex, is better demonstrated than discussed, though often better anticipated than experienced."

#### **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 you are encouraged to own one of several good graduate textbooks in econometrics. 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 CULearn website. You should read the articles assigned prior to coming to class and be prepared to answer questions and participate in discussions. Bring a copy 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 discount through the University's GradPlan. More information is available through a link posted on the CULearn website. I recommend Stata/IC. Prices are \$98 for a one-year license and \$179 for a perpetual license.

Note: SMALL STATA WILL BE INSUFFICIENT FOR THIS COURSE.

You will receive a copy of "Getting Started", an official STATA guide if you elect to purchase your own copy. If you expect to use STATA beyond this course, you can feel free to purchase a

more advanced copy, but the Intercooled version will allow you to complete all the requirements of this course.

I will use STATA during some lectures to demonstrate estimators and methods that we cover. If you have STATA installed on a laptop, you may find it useful to bring on those days.

# **Requirements and Grading:**

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

Assignment	<u>Weight</u>	Due Date
Problem Sets	50%	Every 1-2 weeks (10-15 total)
Paper Replication/Extension	30%	Friday, 12/11 5 PM Hard Copy in my Office
Final Exam	20%	Wednesday, 12/16 7:30-10:00 PM

**Problem Sets** will be assigned roughly weekly, and will be closely related to the topics covered in this course. 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. Although I may ask you to prove something formally, this is much less likely than asking you to simulate or to demonstrate a particular property using real-world or simulated data. Problem Sets will be graded on a 3-point scale, with missing assignments given a grade of zero.

**Paper Replication/Extension**: Unlike the medical sciences, the field of economics places a relatively small weight on the value of replication. 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 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 freely available. You should 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, RD 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. A hard copy of this paper will be due in my office by close of business on December 11.

**The Final Exam** will cover all of the material learned in the course, and will focus on questions related to interpretation and implementation of the techniques we have discussed. I will ask several questions of the form: "Suppose you used to technique X to answer question Y and received the following results. What do they mean? What are you worried about? How could you address potential threat to identification Z? Our assigned time from the Registrar is 7:30-10:00 PM on Wednesday, December 16. University policy provides students with three or more exams on the same day the right to reschedule exams following the first two.<sup>1</sup> Any student wishing to invoke this right should notify me as soon as possible and no later than September 30. I will ask for a printed copy of your schedule to verify the conflict.

<sup>&</sup>lt;sup>1</sup> <u>http://www.colorado.edu/policies/final\_exam.html</u>

**Seminar Series:** You are strongly encouraged to attend the 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.

**Cumulative Grades:** Final letter grades will be determined based on your cumulative performance relative to the scores a good student at this level could reasonably be expected to attain.

**Late Assignments/ Missed Examinations Policy:** Problem Sets will be due by the start of class on their due dates. I will post each week's problem set by the end of the week, and it will be due the following Friday at noon. Following a 5-minute grace period, I will deduct 1 point from each assignment for each day it is late. Assignments submitted more than 48 hours after the due date will receive no credit.

The paper replication must be turned in on time. I will deduct 25 percent of the grade for each day after the deadline when it is turned in.

If you miss the midterm or the final exam you will receive no credit unless you provide documentation of a medical or family emergency. In the case of a legitimate emergency, the missed quiz or exam will be given no weight in the calculation of the final grade and other assignments will be reweighted accordingly. There will be no make-up exams. If you foresee any conflict that will prevent you from taking an exam, please let me know as soon as possible and at least two weeks beforehand.

A note on my role: I will always be 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. In addition, I cannot generally 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 begin to serve as a resource to each other.

# **Tentative Schedule**

Торіс	Tentative Dates
Introduction and STATA Basics	8/24, 8/26
Advanced STATA	
Programming – Do and Log Files, loops, commenting, simulation	8/31
Data Management – Merge, Collapse, egen, etc.	9/2
Linear Regression Review	
Functional Forms – Polynomials, Logs, Categorical Variables, Interactions	9/9, 9/14
Omitted Variable Bias Review of FWL and the meaning of "controlling for"	9/16
The Randomized Control Trial Treatment Effects – Potential Outcomes Framework	9/21
Panel Data Models	
Difference-in-Differences	9/23, 9/28 – paper
Fixed Effects, Moulton Problem - clustering	9/30, 10/5, 10/7 – paper
Event Study Models	10/12
Instrumental Variables	
Basics	10/14
Local Average Treatment Effects	10/19
Weak Instruments	10/21
Regression Discontinuity	10/26, 10/28– papers
Heckman Selection Model	11/2
Propensity Score Matching	11/4, 11/9
Propensity Score Reweighting	11/11 – paper
Duration Models	11/16, 11/18
Binary Dependent Variables	11/30, 12/2
Discrete Choice Models	12/7, 12/9
FINAL EXAM	12/16 7:30-10:00 PM

# **Other University Policies:**

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please inform me no later than two weeks prior to any conflict you foresee, sooner if possible, so that we can find an alternative arrangement for you to complete the requirements of the course. See full details at <a href="http://www.colorado.edu/policies/fac\_relig.html">http://www.colorado.edu/policies/fac\_relig.html</a>

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and <u>www.Colorado.EDU/disabilityservices</u>

Students and faculty each have responsibility for maintaining an appropriate learning environment. 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 differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at

http://www.colorado.edu/policies/classbehavior.html and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student code

The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <a href="http://www.colorado.edu/odh">http://www.colorado.edu/odh</a>

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <a href="http://www.colorado.edu/academics/honorcode/">http://www.colorado.edu/academics/honorcode/</a>