

Econ 480-3
Introduction to Econometrics
Spring 2020

IMPORTANT: Lectures, discussions, and office hours will be held in ZOOM until further notice. Check Canvas to find out when we go back to the classroom. REGISTER NOW!

Instruction:

Lecture: **T-Th** 9:00AM – 10:50AM, KGH 1410

Discussion: **F** 3:00PM – 4:50PM and **M** 1:30PM – 3:20PM, KGH 1410

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Teaching Assistant: Deborah Kim

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Office Hours: M 5:00PM – 7:00PM

Course Description: This course is the third quarter of the first year graduate econometric sequence. It covers estimation and inference in a variety of settings, including linear models with endogeneity, panel data models, difference in differences, and other models that are widely used in empirical economics. The course assumes that all students are comfortable with the kind of asymptotic theory covered in 480-2, so the focus of the discussion will be on issues of identification, interpretation, and practical implementation to some degree. Some topics do require advanced asymptotic arguments and those will be covered in class. The class schedule on the last page contains a detailed list of topics.

Grading: The class grade consists of problem sets (submitted via Canvas), a midterm exam on **Tuesday May 5th in class**, and a final exam on **Thursday June 11th at noon**. The weighting scheme for the final grade will be as follows:

Problem Sets: 20%

Midterm Exam: 35%

Final Exam: 45%

- **Problem sets:** Problem sets are due at **12 PM** on their due date and must be submitted via CANVAS. Late problem sets are not accepted, and there are no make-up problem sets. You may work in **groups of 2** as long as both members are clearly listed at the top of every copy and each group member **uploads their own copy**.
- **Exams:** There are no make-up exams and no rescheduling. No calculators, cell phones, laptops, or other electronic devices may be used. The exam is closed-book, but we will provide a copy of an official double-sided page of notes.

Discussions: There are two types of discussion sessions in this course. The Friday discussion covers extensions of material covered in lecture and goes over exam and problem set questions. The Monday discussion works “on-demand” and is intended more as a review or background session that goes over simpler problems suggested by you earlier in the week. Talk to the TAs to determine if both, any, or none are appropriate for you.

Readings: I will provide some rudimentary lecture notes every week with related references you are supposed to read. There is no textbook for this course since the topics are standard and covered in many textbooks. My recommendations are the following:

- Read parts of *Econometric Analysis of Cross Section and Panel Data* (2010) by Jeffrey M. Wooldridge. This textbook is available for free in electronic form through the university library.
- Read parts of *Econometrics* (2020) by Bruce E. Hansen. This textbook is available for free on Bruce’s website.
- Consult parts of *Mostly Harmless Econometrics* (2009) by Joshua D. Angrist and Jörn-Steffen Pischke. A new copy sells for under \$30 on Amazon and is worth buying if you are interesting in doing empirical work and/or studying econometric theory.
- Consult parts of *Microeconometrics: Methods and Applications* (2005) by Cameron and Trivedi. This is a comprehensive review of econometrics that is aimed at researchers rather than students.

Software: The problem sets will require you to use Stata (or equivalent) and some programming language such as R, MATLAB, Python, or equivalent. R is free and may serve both purposes. Programming languages will not be taught during class. You are expected to determine on your own what you need to learn to complete the programming assignments. In the process of doing this, you will teach yourself how to teach yourself, which is a crucial skill for success in graduate school. Related useful skills you may gain are “Google-Fu” and the ability to RTFM.

Computer Research Support: The university offers a wide range of computational resources that are available to students. They all require the student to first apply for an account, but doing so is usually straightforward. All students registered to this class will have access to a Quest allocation. Quest is the largest computer cluster at Northwestern (<http://www.it.northwestern.edu/research/user-services/quest/>). Kellogg students also have access to the Kellogg Unix server (<http://www.kellogg.northwestern.edu/rs/>). All these servers provide access to a wide selection of analytical software, including the ones mentioned above, and allow users to run multiple jobs simultaneously. If you prefer to install the software on your own computer, student discounts are available for Stata and MATLAB. More detailed information about how to use this resources will be provided during the first Monday discussion session on **Monday April 13th**.

AccessibleNU: Any student requesting accommodations related to a disability or other condition is required to register with AccessibleNU (847-467-5530) and provide professors with an accommodation notification from AccessibleNU, preferably within the first two weeks of class. All information will remain confidential.

Zoom: We will be using Zoom for remote instruction. Each lecture will be recorded and available to watch later on Canvas. If you plan to watch the lecture “live”, please be aware of the following guidelines:

- If you have a short notation-like question like “is that a beta or a gamma?” you may ask your question in chat. Deborah and Cai will act as chat moderators and will immediately answer such questions.
- If you have a clarification question, use the “raise your hand” feature. My expectation is that you will ask questions and I will plan to answer all of them on a first come, first served basis.
- The use of video is encouraged. Assuming our connections speeds are fast enough I would prefer if you use video, at the very least, when you ask questions. Your microphones will be muted by default and I (or you) will un-mute them when you want to ask your question. Even if your camera is not on all the time, it would be a good idea to turn it on when you are talking so that we can see each other.
- Note-taking may be challenging in a Zoom lecture. To ease with this, I plan to do the following. First, whatever slides I use for the lecture will be available for you to download a few minutes before the lecture starts. Second, I highly recommend you watch the video trying to understand what I say and then watch it a second time to take notes.
- My regular lectures (in the classroom) usually last exactly 1 hour and 50 minutes. Using Zoom will make the lectures go much faster. I have decided not to teach “more” material as a consequence of this as this is (hopefully) not a permanent change.

Tentative Course Schedule: Econ 480-3 Spring 2020

Lecture	Date	Topics	PS out	PS in
Part I: Estimation				
1 (Zoom)	Tu, April 7	Linear Regression	1	–
2 (Zoom)	Th, April 9	Linear Regression	–	–
3 (Zoom)	Tu, April 14	Basic Inference	–	–
4 (Zoom)	Th, April 16	Instrumental Variables	2	1
5 (Zoom)	Tu, April 21	Instrumental Variables	–	–
6 (Zoom)	Th, April 23	Generalized Method of Moments & Empirical Likelihood	–	–
7	Tu, April 28	Panel Data	3	2
8	Th, April 30	Difference in Differences	–	–
-	Tu, May 5	Midterm Exam	–	–
Part II: Some Topics				
9	Th, May 7	Non-parametric Regression & Matching	–	–
10	Fr , May 8	Regression Discontinuity	4	–
11	Tu, May 12	CART & Random Forests	–	–
12	Th, May 14	LASSO	–	–
13	Tu, May 19	Binary Response	5	4
Part II: Inference				
14	Th, May 21	HC Covariance Estimation	–	–
15	Tu, May 26	HAC Covariance Estimation	–	–
16	Th, May 28	Cluster Covariance Estimation	6	5
17	Tu, June 2	Bootstrap	–	–
18	Th, June 4	Subsampling & Randomization Tests	–	–
–	Th, June 11	FINAL EXAM at 12PM	–	–