Econ 480-3
Introduction to Econometrics
Spring 2021

Instruction:

    Lecture: **T-Th** 9:00AM – 10:50AM, on Zoom
    Discussion: **F** 9:00AM – 10:50AM and **W** 1:00PM – 2:50PM, on Zoom

Instructor: Ivan Canay

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Teaching Assistant: Amilcar Velez Salamanca

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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 4th in class**, and a final exam on **Thursday June 10th 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. Both exams will be administered via a Quiz on Canvas and will be timed (from the time you download the questions to the time you upload your answers). More information will be provided in class.

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 Wednesday 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 (2021) 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 Friday discussion session on **Friday April 2nd**.

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.

Remote Format: We will be meeting on Zoom for remote instruction. To accommodate students in other timezones, lectures are not mandatory. Lectures will be recorded and these recordings will be available for viewing only by students in the class (see Zoom tab in Canvas). Students are strongly encouraged to join the live lectures. Students joining the lectures should follow the following guidelines for zoom lectures:

- The use of video is encouraged. Assuming our connections speeds are fast enough I would prefer if you have your video on during the lecture. If you chose to have your video off and you wish to ask a question, please **turn on your video** when you do so.

- Microphones should be **muted** during lecture. You should of course turn on your microphone when you want to ask a question.

- Deborah and Amilcar will monitor chat so you may use that feature if you find it convenient. However, I will not be personally monitoring chat while I teach.

- Note-taking may be challenging in a Zoom lecture. To ease with this, I plan to do the following.

  - The slides I use for the lecture will be available for you to download a few minutes before the lecture starts. You should check Canvas before the start of each class.

  - During lecture I will make annotations on the slides and you should feel free to do the same.

  - After each class I will upload the slides that contain the annotation I made during lectures so if you decided not to take notes while I teach, you will have the completed version of the slides at the end of the lecture.

- If you need to review the material, you will have the recorded lecture available on Canvas.

Lecture Recordings: Lectures will be recorded and available to students in the class and can be found on Canvas. Per the university policy: Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings — including distributing or posting them — is also prohibited. Under the University's Copyright Policy, faculty own the copyright to instructional materials — including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up

Authenticated Zoom Account: Zoom lectures and discussions will be limited to only those with Northwestern NetIDs (preventing non NU participants). Make sure you Zoom account is a Northwestern Zoom Account.

Tentative Course Schedule: Econ 480-3 Spring 2021

Lecture	Date	Topics	PS out	PS in
		Part I: Estimation		
1	Th, April 1	Linear Regression	1	–
2	Tu, April 6	Linear Regression	–	–
3	Th, April 8	Basic Inference	–	–
4	Tu, April 13	Instrumental Variables	2	1
5	Th, April 15	Instrumental Variables	–	–
6	Tu, April 20	Generalized Method of Moments & Empirical Likelihood	–	–
7	Th, April 22	Panel Data	3	2
8	Tu, April 27	Difference in Differences	–	–
-	**Tu, May 4**	**Midterm Exam**	–	–
		Part II: Some Topics		
9	Th, April 29	Non-parametric Regression & Matching	–	–
10	Th, May 6	Regression Discontinuity	4	–
11	Tu, May 11	CART & Random Forests	–	–
12	Th, May 13	LASSO	–	–
13	Tu, May 18	Binary Response	5	4
		Part II: Inference		
14	Th, May 20	HC Covariance Estimation	–	–
15	Tu, May 25	HAC Covariance Estimation	–	–
16	Th, May 27	Cluster Covariance Estimation	6	5
17	Tu, June 1	Bootstrap	–	–
18	Th, June 3	Subsampling & Randomization Tests	–	–
–	**Th, June 10**	**FINAL EXAM at 12PM**	–	–