# ECON60303: Econometrics II

University of Notre Dame
Spring 2024-25

| | |
|---|---|
| Instructor: Prof. Marinho Bertanha | E-mail: mbertanha@nd.edu |
| Lectures: Tue & Thu 1:15p-3:15p | Office Hours (O.H.): Tue & Thu 11a-12p |
| Classroom: 127 Hayes Healy Center | Office: 3074 Jenkins Nanovic |

| | |
|---|---|
| Teaching Assistant (T.A.): Carolyn Davin | E-mail: cdavin1@nd.edu |
| Tutorials: Wed 5p-6:15p | Office Hours (O.H.): Mon & Wed 11a-12p |
| Classroom: 330 DeBartolo Hall | Room: 3002 Jenkins Nanovic |

## Course Description

Econometrics is the set of statistical tools that economists use to analyze data and answer questions of economic interest. One of the main differences between Econometrics and Statistics is that Econometrics is driven by economic applications: estimation of models of economic behavior, causal effects of a policy or social program, forecasts of economic variables, measures of risk, etc. In this course, you will learn how to use econometric models to obtain useful estimates to those quantities that interest economists. Learning econometrics well involves three types of skills. First, the understanding of statistical properties of each model and estimator. This is typically the hardest part and where we'll spend most of our time. Second, the computational tools to implement these models with real or simulated data. We will learn that through exercises in the assignments using MATLAB and STATA. Third, the empirical knowledge necessary to gather data, choose an appropriate model, and interpret the numbers produced by each estimator. The third type of skill is very specific to each field in economics, and you will only master that once you take the field courses and study the relevant empirical literature. The third type of skill is not the focus of this course, although we will discuss some examples in class and there will be a paper-replication assignment at the end of the semester.

## Textbook References

- B Hansen. *Econometrics*. Princeton University Press, 2022b
- J Wooldridge. *Econometric Analysis of Cross Section and Panel Data*. MIT Press, second edition, 2010

## Additional References


- J Angrist and J Pischke. *Mostly harmless econometrics*. Princeton University Press, 2008;
- C Cameron and P Trivedi. *Microeconometrics: Methods and Applications*. Cambridge University Press, 2005;
- R Davidson and J MacKinnon. *Econometric Theory and Methods*, volume 5. Oxford University Press New York, 2004;
- W Greene. *Econometric Analysis*. Pearson Education India, eight edition, 2018;
- A Goldberger. *A Course in Econometrics*. Harvard University Press, 1991;
- B Hansen. *Probability and Statistics for Economists*. Princeton University Press, 2022a;
- F Hayashi. *Econometrics*. Princeton University Press, 2000;
- A Colin Cameron and Douglas L Miller. A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, 50(2):317–372, 2015.


## Pre-requisites

ECON 60302 (Econometrics I) or equivalent.

## Evaluations

- Problem sets: there will be problems sets every two weeks, due on Thursdays by the beginning of lecture. You are allowed and encouraged to work with other students in this class, but you are required to hand-in your own solutions. For programming questions, you are expected to hand-in your own code and output. A pset without the code or output is an incomplete pset. Some questions in the psets are references to textbook questions. Please make sure you have the right edition of the textbook (see references above). A pset handed in on time that is complete will be given one out of three grades: check plus (100 %), check (87.5%), and check minus (77.5%).
- Quizzes: for those weeks when there is no problem set due, we will have a short quiz at the beginning of class on Thursdays. These are 30min, closed book, mini-exams designed to help you keep track of your progress throughout the semester. Aside from quizzes, there are no midterms or a final for this class. You are allowed to use one cheat sheet handwritten by you during the quizzes. The cheat sheet must be at most one page, letter size, and single sided. You are only allowed to use a cheat sheet that strictly conforms to these rules. Everybody has bad days, so I will discard your worst quiz grade when computing the average grade of quizzes.

- Empirical project: there will be a written paper due on **Wednesday May 7th** at 12 noon based on an empirical project carried by you and your group (groups of 2 or 3 students). Your group has to replicate the results of a recent economics publication using **both** STATA and MATLAB along with the methods learned in this class. You are required to work with your group and to do your fair share of the work. You need to hand-in an outline of your project on **Tuesday March 18th** by the beginning of class.
- Course participation: you will receive a participation grade based on your citizenship in this course. Examples of good citizenship include: coming to lectures, being focused in the classroom, handing in every assignment on time, asking/answering questions in class or during office hours, and avoiding noise and disruption during lectures. Please silence your cellphones, watches, tablets, and alarms before class begins. Please avoid side conversations, texting, typing, and picture taking. If you want to say something during lecture, please raise your hand and wait for permission. If you are in need of accommodations that include (but is not limited to) using a computer or smart device during lecture, please do not hesitate to contact me. All classes are in person; virtual connection or recordings are not available.

Your final grade for this course will be an average of your problem sets (30%), quizzes (30%), empirical project (30%), and participation (10%).

## Expectations

Students are expected to be on time and prepared for class, and to hand-in assignments when due. I will not accept late assignments. Use problems sets and quizzes to evaluate your own progress, and please come to office hours with questions. Students who miss an assignment must have a valid, documented, and university-approved excuse before requesting a make up.

## Honor Code

This course is a community built on trust; in order to create the most effective learning experience, our interactions, discussions, and course activities must remain private and free from external intrusion. As members of this course community, we have obligations to each other to preserve privacy and cultivate fearless inquiry. We are also obliged to respect the individual dignity of all and to refrain from actions that diminish others' ability to learn. Course materials (videos, assignments, problem sets, etc) are for use in this course only. You may not upload them to external sites, share with students outside of this course, or post them for public commentary without my written permission. The university strictly prohibits anyone from duplicating, downloading, or sharing live class recordings with anyone outside of this course, for any reason. Violating these principles will be handled according to the academic honor code.

Students are expected to not engage in or tolerate academic dishonesty. This also includes, but it is not limited to, copying solutions (which includes computer code and output) from instructors or students inside or outside our course community, in the current or past semesters. Students are not allowed to use artificial intelligence to obtain answers or computer code to the assignments. Please familiarize yourself with the University's code of honor at **honorcode.nd.edu**.

## Helpful Resources

1. MATLAB and STATA are installed on OIT Lab computers on campus and student licenses may be available at special rates, contact OIT (**oit.nd.edu**) for more info.
2. You can access a computer lab remotely from your computer. Please go to this **link** to get started.
3. You may also connect your computer to a CRC server and use MATLAB/STATA remotely. The first step is to visit **crc.nd.edu** and request a CRC account. Learning how to use the servers on campus will serve you well in a variety of research areas during grad school. This is particularly helpful to run jobs that take a long time to run in your computer.
4. If you would like to install STATA in your own computer, the cheapest possible license is a 6-month student license currently at $48. For details visit **www.stata.com**, click on purchase, order Stata, choose US as your country, student, new purchase, 6-month.
5. Besides the examples given in the course, your primary source of help with STATA/MATLAB is the web. If you need extra help with programming, please contact the TA.

## Topics and References

1. Linear Regression: H: 2.11, 2.18, 2.22-2.24, 3.18, 4.2-4.9, 4.11, 4.13-4.15, 4.20, 7.1-7.3, 7.5-7.7, 7.12, 7.16
2. Multivariate Regression: W: 7.1-7.5, 7.7 // H: 11.1-11.10
3. Instrumental Variables: W: 5,6 // H: 12, A.6 // AP: 4.1-4.2, 4.6
4. Generalized Method of Moments: H: 13 // W: 8,9,14
5. Binary Response: W: 15.1-15.6 // AP: pages 47-51, 93-107
6. Censoring and Sample Selection: W: 17.1-17.4, 19.2-19.3, 19.5-19.6.1
7. Pooled Cross Sections and Panel Data: W: 6.5, 10, 11.1-11.2 // AP: 5
8. Cluster Sampling: H: 4.21-4.23, 12.25, 13.13 // W: 20.3 // AP: 8.2 // CM2015

W - Wooldridge, H - Hansen (Econometrics), AP - Angrist & Pischke, CM2015 - Cameron & Miller (2015) article (see above).

| Week | Dates | Notes |
|---|---|---|
| 1 | 14-Jan | Lecture 1 |
| | 16-Jan | Lecture 2 |
| 2 | 21-Jan | Lecture 3 |
| | 23-Jan | Lecture 4<br>Quiz 1 |
| 3 | 28-Jan | Lecture 5 |
| | 30-Jan | Lecture 6<br>Pset 1 |
| 4 | 4-Feb | Lecture 7 |
| | 6-Feb | Lecture 8<br>Quiz 2 |
| 5 | 11-Feb | Lecture 9 |
| | 13-Feb | Lecture 10<br>Pset 2 |
| 6 | 18-Feb | Lecture 11 |
| | 20-Feb | Lecture 12<br>Quiz 3 |
| 7 | 25-Feb | Lecture 13 |
| | 27-Feb | Lecture 14<br>Pset 3 |
| 8 | 4-Mar | Lecture 15 |
| | 6-Mar | Academic trip<br>No class, no office hours |

| Week | Dates | Notes |
|---|---|---|
| | 11-Mar | Spring break<br>No classes, no office hours |
| | 13-Mar | |
| 9 | 18-Mar | Lecture 16<br>Project outline |
| | 20-Mar | Lecture 17<br>Quiz 4 |
| 10 | 25-Mar | Lecture 18 |
| | 27-Mar | Lecture 19<br>Pset 4 |
| 11 | 1-Apr | Lecture 20 |
| | 3-Apr | Lecture 21<br>Quiz 5 |
| 12 | 8-Apr | Lecture 22 |
| | 10-Apr | Lecture 23<br>Pset 5 |
| 13 | 15-Apr | Lecture 24 |
| | 17-Apr | Lecture 25<br>Quiz 6 |
| 14 | 22-Apr | Lecture 26 |
| | 24-Apr | Lecture 27<br>Pset 6 |
| 15 | 29-Apr | Lecture 28<br>Last class |
| Finals | 7-May | Final Project |