

INTRODUCTION TO ECONOMETRICS

EC320

Syllabus, Summer 2024

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Basics

	Lecture
lecture	Recordings posted on Canvas
office hours	Tuesday: 11am-12pm Thursday: 3-4pm
Lab	Wednesday: noon-2pm
materials	1. Introduction to Econometrics 2. Mastering 'Metrics
repository	github.com/dyasui/EC320Su24

Course Summary

This course introduces statistical techniques that economists use to test economic theories and to estimate the relationships between economic variables. Econometrics combines economics and statistics with data to analyze and measure economic phenomena. In this class, we will focus our attention on regression analysis—the workhorse of applied econometrics. Using calculus and introductory statistics, we will cultivate a working understanding of the theory underpinning regression analysis, emphasizing the assumptions we must make to make causal statements. Statistical programming is fundamental to practicing applied econometrics. Thus we will teach the statistical programming language **R** to apply insights from theory and learn how to work with data. To the extent that you invest the requisite time and effort, you can leave this course with marketable skills in data analysis and—most importantly—a more sophisticated understanding of the notion that *correlation does not necessarily imply causation*.

Software

- We will use the statistical programming language **R**.
- We will use **RStudio** to interact with **R**.

Learning **R** is challenging, but well worth the effort. **R** is a powerful and versatile tool for data analysis and visualization, which makes it popular among employers. If you dedicate the time and effort necessary to learn the language, you are likely to reap a handsome return on the job market. I expect that you install **R** and **RStudio** on your own computer. Don't worry, both are free. I also recommend that you be thoughtful of how you choose to organize your saved scripts, data, and assignments (e.g. Home > Documents > Classes > EC320). For convenience, I make material available through Github.

Textbooks and Other Readings

Econometrics books: There are two required textbooks for this course:

1. [Introduction to Econometrics](#), 5th ed. by Christopher Dougherty (**ItE**)
2. [Mastering 'Metrics: The Path from Cause to Effect](#) by Angrist and Pischke (**MM**)

You can purchase them at the UO duckstore or your preferred online bookseller. I recommend that you read (or at least skim) the assigned readings from the textbooks *before* lecture. The lectures and the readings are meant to **complement** one another. The tentative course schedule (below) lists the assigned readings for each topic.

R books: For learning R, a classic is Garrett Grolemond and Hadley Wickham's [R for Data Science](#). If you have previous experience coding in R, you may want to check out Hadley Wickham's [Advanced R](#).

Prerequisites:

Math 242 (Calculus) and Math 243 (Introduction to Statistics) or equivalent.

Labs, Assignments, and Exams

Lab

Although this class is officially asynchronous, I will also be offering optional **synchronous** lab sections. This will be a time scheduled every week where you can join a Zoom meeting and be placed in breakout rooms where you can work on assignments or quizzes collaboratively with other class members, or get direct help from me. I recommend participating in these lab sessions if you are able. Between the amount of math we used in this class and learning to code in R, there will be a lot of potentially challenging material for you to tackle on your own. Even if you are fairly comfortable with math and coding, I have found that it can be rewarding to work with peers and explaining things in your own words can help solidify your own understanding.

- While Lab sessions are optional, I will give an **extra credit point for every session you attend and actively participate during**.

Problem Sets and Koans

Every week, you will have **one problem set** as well as around **3~4 koans** and **4 Canvas quizzes** to complete.

Problem sets will primarily focus on analytical problems but may include a computational component. Submissions **must be your own work**. You will receive **zero points** for copied work.

- Due on Friday midnight every week.
- **PDF** and **html** are the only file types accepted for problem sets on Canvas
- One file per problem set is permitted
- Your lowest problem set score will be dropped

Feel free to work together on the assignments. Unless explicitly stated, **each student is required to write and submit independent answers**. This means that word-for-word copies will not be accepted and will be viewed as academic dishonesty. In other words: You must place answers **in your own words and code**. Copying from other people (even if you worked with them) or from previous assignments is considered cheating. Both will be submitted on Canvas under the "Assignments" tab.

Koans will be strictly focused on developing your computational skills in R. They will be short and if you are actively keeping up with learning R, it should not take long to complete them.

- All koans assigned for a given week will be due Friday midnight, but I recommend submitting one per day.
- **html** is the only file type accepted for Koans on Canvas
- Your lowest koan score will be dropped

Most of the Koans will be assigned in the first half of the course. Toward the later half of the course, the problem sets will become more dependent on R and Koans will be less frequent. These problem sets will be longer and will have more time to complete them.

Quizzes will be short multiple choice or numeric questions to help you check your understanding.

- They will be graded based on completion only to make sure you are following along.

Exams will be timed, open-note, but individual and closed-internet.

- You will have fixed amount of time to complete the quiz, but you can open it at any time from the Friday when it is posted to Sunday midnight.
- You must submit a *handwritten scan* of your work
- Presentation matters. You may lose points for poor penmanship, scans, and presentation

Late Policy

- Late assignments will be accepted **up to 48 hours late** with a penalty of **2% per hour late**
- For example, when submitted 10 hours late, an assignment with a 90% score would be penalized by 20%, and the resulting final grade would be a 70%
- One koan and one problem set will be dropped at the end of the term

Exams

- The **Midterm** will be a timed Canvas quiz which will be released **Friday, July 5**. You will have 2 hours to complete, scan, and upload it.
- The **Final** will be on **Friday, July 19, 2024**

Canvas exams will be open-note, but you will not be allowed to access other internet resources. All work should be completed independently in your own words.

Makeup Assignments

I do not give makeup assignments. In extreme circumstances that lead you to miss the midterm exam, I will consider re-weighting your grade toward the final. To qualify for re-weighting, you will need to notify me no later than two days after the exam.

Grades

Grades for this class will be assigned based on the following assignments: weekly homework assignments, one midterm exam, one final exam. Final grades will be determined based on your rank-ordered position within the class (i.e., the course is curved)¹. The weights for the final grade:

Component	Percentage
Koans	10%
Quizes	10%
Problem sets	10%
Midterm exam	35%
Final exam	35%

Note: While assignments will be submitted on Canvas, due to any potential curving of final grades, the gradebook on Canvas may not be accurate—only an approximation. All adjustments of final grades will be done in a local spreadsheet.

Recommendations²

1. Be kind
2. **Take responsibility** for your own education and try to **learn** as much as you can
3. **Do your own work**
4. Develop your own **intuition**
5. Learn **R**. Struggle while you try and use Google or LLMs to figure things out
6. Come to **office hours**
7. Don't wait until the end of the term to ask for help
8. Start problem sets **early**—so you can come ask for help

Academic Integrity

I will not tolerate cheating, plagiarism, and other violations of the [Student Conduct Code](#). If you are caught cheating or plagiarizing on any component of this course, you will receive a failing grade for the term and I will report your offense to the university.

Accommodations

Notify me if there are aspects of this course that pose disability-related barriers to your participation. If you require special accommodations for a documented disability, then you will need to provide me a letter from the [Accessible Education Center](#) (AEC) that verifies your need and details the appropriate accommodations. Please make arrangements with the AEC by the end of Week 1. If your accommodations include exam proctoring at the AEC, then you are responsible for scheduling those exams with the AEC **at least seven days in advance**.

¹The economics department has a uniform grading standard. In 300 and 400 level classes, roughly 65% of the class will receive A's and B's. I will not be able to tell you what your exact letter grade is at any point in time, because it depends on the scores of everyone else at the end of the course, but I will be able to give an assessment of your relative standing.

²Inspired from Professor Ed Rubin

Acknowledgements

This class was originally created by [Andrew Dickinson](#). All class materials for this class were forked from his original repository [here](#). His original acknowledgment section is replicated below:

Material for this course has contributions from [Ed Rubin \(@edrubin\)](#), [Kyle Raze \(@kyleraze\)](#), [Philip Economides \(@peconomi\)](#), and [Emmett Saulnier](#), who have taught the class prior to me and graciously made their work public and inspired me to pay it forward. Additionally I source some material from [Nick Huntington-Klein \(@NickCHK\)](#), who maintains a [trove of resources](#) for learning causal inference, and [Ben Lambert](#) and his [undergraduate course in econometrics](#) that helped me learn this material as a student and to teach this material as an instructor. Finally, I would like to thank [Colleen O'Briant \(@cobriant\)](#) for making available her [tidyverse_koans](#) materials for use in this course.

HTML slides are generated using the [quarto](#). Source code for the slides is available in the “slides” directory of this repository. PDFs of the slides are generated using the `renderthis` package in R. PDF Documents are compiled in quarto and using the wonderful quarto extension [PrettyPDF](#) by [Nicola Rennie](#).

Tentative Schedule

EC320

Week	Lectures	Readings	Assignments
1	Introduction	Syllabus	Install R and RStudio
1	Stats Review	ItE Review, MM 1 (appendix)	K01, 02, 03
1	Fundamental Econometric Problem	MM 1	HW 1
1	The Logic of Regression	MM 2	Quiz 1
2	Linear Regression: Estimation	ItE 1	K04, 05, 06, 06b
2	Classical Assumptions	ItE 2	HW 2
2	Linear Regression: Inference	ItE 2	Quiz 2
2	Linear Regression: Estimation	ItE 2	Midterm
3	Multiple Linear Regression: Estimation	ItE 3, 6.2; MM 2 (appendix)	K07, 08, 09, 10
3	Multiple Linear Regression: Inference	ItE 3	HW 3
3	Nonlinear Relationships	ItE 4	Quiz 3
4	Qualitative Variables	ItE 5	K11, 12, 13
4	Model Specification	ItE 6	HW 4
4	Heteroskedasticity	ItE 7	Quiz 4
4	Final Review	Review Sheet	Final Exam