INTRODUCTION TO ECONOMETRICS

Syllabus, Summer 2024

Dante Yasui

Basics

	Lecture	Lab
when	*asynchronous*	*TBA*
where	Canvas	Zoom
who	**Dante Yasui**	
	dyasui@uoregon.edu	
office hours	**TBA**	
	(Or by appointment)	(Or by appointment)
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 Grolemund 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 ***syncronous*** 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 quizes 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 together with peers who might not have as much experience as having to explain things in your own words can help solidify your own understanding.

Problem Sets and Koans

Every week, you will have ***one homework sheet***, around ***3~4 koans***, and ***one Canvas quiz*** 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 Sunday 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

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

- All koans assigned for a given week will be due Sunday midgight, but I recommend submitting one per day.
- **html** is the only file type accepted for Koans on Canvas
- Koans will directly relate to topics covered in lab section. Use the lab section recordings as a resource to complete these assignments
- Your lowest koan score will be dropped

Quizes

- Each quiz will be one long-answer, exam-style question
- You will have fixed amount of time to complete the quiz, but you can open it at any time during the week

- You must submit a ***handwritten scan*** of your work
- Presentation matters. You may lose points for poor penmanship, scans, and presentation

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.

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.

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 and upload it.
- The **Final** will be on **Friday, July 19, 2024**
- A **Take-Home Final** will be assigned during the last week and will be due **Sunday, July 21**

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.

The **Midterm** will be in-class and will cover material from the beginning of the term through the week before the exam. The **Final** exam will be comprehensive and will cover all material from the term. The **Take-Home Final** will be assigned during the last week of class and will be designed to test your ability to apply concepts from the course to conduct analysis on real data using **R**.

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.

Recommendations[2]

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***.

[1] The 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.

[2] Inspired 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 (@NickCH-K), who maintains a trove of resources for learning causal inference, and Ben Lambert and his undergradaute 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

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***