INTRODUCTION TO ECONOMETRICS

Syllabus, Spring 2024

Andrew Dickinson

Basics

	Lecture	Lab
when	T & Th 12:00p–1:20p	*asynchronous*
where	140 Tykeson Hall	Canvas
who	Andrew Dickinson	Dante Yasui
	adickin3@uoregon.edu	dyasui@uoregon.edu
	ajdickinson.github.io	
office hours	T & Th 1:20–2:00p	TBA
	F 10:00-11:00a	
	(Or by appointment)	(Or by appointment)
materials	1. Introduction to Econometrics	
	2. Mastering 'Metrics	
repository	github.com/ajdickinson/EC320S24	

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

Labs will be delivered ***asynchronously*** this quarter. The scheduled Wednesday lab section will serve as an in depth help session where you may ask for help on Koans or ask general R questions. In lab section, you will learn to apply the concepts discussed in lecture using R. The main focus is on the practical application of statistical techniques and computational components of the bi-weekly problem sets. Lab section is ***crucial*** for learning the material and passing the course.

Problem Sets and Koans

Most weeks throughout the quarter, there will be two short form assignments:

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 Tuesday evenings at 11:59p each week. See Canvas for exceptions
- **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
- Presentation matters. You may lose points for poor penmanship, scans, and presentation

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.

- Due on Friday evenings at 5:00p each week. See Canvas for exceptions
- **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

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 ***likely*** take place in class on **Monday, May 07 2024 @ 12:00-1:20p**
- The **Final** will be on **Thursday, June 13, 2024 @ 8:00-10:00a**
- A **Take-Home Final** will be assigned during week 10 and will be due on the day of the final exam

There will be no option to take exams early or remotely. Adjust your travel schedule accordingly. Please bring your ***scientific calculator*** and ***student ID*** for each exam. You will not be allowed to use your phone or any other electronic device during the exam. No cheatsheet will be allowed for exams, however, you will be provided with a list of formulas.

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: (approximately) biweekly 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	5%
Problem sets	10%
Midterm exam	35%
Take-Home Final exam	15%
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

Etiquette

Please respect those around you by turning off your phone and other potentially distracting devices. I ask that you stay for the entire lecture: getting up and leaving distracts your fellow classmates. If you must leave early, please position yourself near the door when you get to class.

Acknowledgements

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.

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

Class	Date	Topic	Reading
01	04/02	Introduction	
02	04/04	Statistics Review I	ItE Review
03	04/09	Statistics Review II	ItE Review; MM 1 (appendix)
04	04/11	Fundamental Econometric Problem	MM 1
05	04/16	The Logic of Regression	MM 2
06	04/18	Linear Regression: Estimation I	ItE 1
07	04/23	Linear Regression: Estimation II	ItE 1
08	04/25	Classical Assumptions	ItE 2
09	04/30	Simple Linear Regression: Inference	ItE 2
10	05/02	Midterm Review	
11	05/07	**Midterm Exam (in-class)**	
12	05/09	Multiple Linear Regression: Estimation	ItE 3, 6.2; MM 2 (appendix)
13	05/14	Multiple Linear Regression: Inference	ItE 3, 6.3; MM 2 (appendix)
14	05/16	Nonlinear Relationships	ItE 4
15	05/21	Qualitative Variables	ItE 5
16	05/23	Interactive Relationships	ItE 4
17	05/28	Interactive Relationships	ItE 4
18	05/30	Model Specification	ItE 6
19	06/04	Heteroskedasticity	ItE 7
20	06/06	Final Review	
F	**06/13**	**Final Exam, 08:00a** (see schedule)	