EC320 Intro to Econometrics

Boyoon Chang

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What	When	Where	Who
Lecture	MW 1200-1320	TYKE 140	Boyoon Chang
Lab 1	W 1600-1720	MCK 442	Kyutaro Matsuzawa
(Lab 2	W 1730-1850	ASYNC WEB	Kyutaro Matsuzawa)
Office Hours	MW 1400–1500	PLC 420	Boyoon Chang
Office Hours	TR 1400-1500	Zoom	Kyutaro Matsuzawa

Materials

- Introduction to Econometrics, 5th ed.
- Mastering 'Metrics
- R
- RStudio

Instructor

- Boyoon Chang
- bchang.me
- bchang@uoregon.edu
- PLC 420

- MW 1400–1500 or by appointment

GE

- Kyutaro Matsuzawa
- kyutarom@uoregon.edu
- Zoom

- TR 1400-1500

Course summary

Description: This course introduces the statistical techniques that help economists learn about the world using data. We will focus much of 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—*how* it works, *why* it works, and, *when it can lead us astray*. We will apply the insights of theory to work with and learn from actual data using `R`, a statistical programming language. 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**.

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

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. The SSIL lab in McKenzie has `R` and `RStudio` installed and ready for you, but I strongly recommend that you install these programs on your own computer. Don't worry, **both are free**. I also recommend that you purchase a flash drive to save your scripts, data, and assignments. Alternatively, you can use Dropbox using your Duck Id.

If you are concerned about learning `R`—or you want to learn quicker—I recommend that you check out the following free online resources:

- DataCamp's *Introduction to R*
- Computerworld's *Beginner's guide to R*

The `RStudio` team has also assembled a useful set of resources.

Textbooks

There is one required and one recommended textbook for this course:

- **Required: Introduction to Econometrics**, 5th ed. by Christopher Dougherty (**ItE**)
- **Recommended: Mastering 'Metrics: The Path from Cause to Effect** by Angrist and Pischke (**MM**)

You can purchase them at the Duckstore or your preferred online bookseller. You should complete the assigned readings from the textbooks *before* lecture. Attending lecture is not a substitute for reading and comprehending the texts. Likewise, reading is not a substitute for attending lecture. The lectures and the readings are meant to *complement* one another. The tentative course schedule (further below) lists the assigned readings for each topic.

In addition to the textbook readings, I may occasionally assign readings from peer-reviewed studies for classroom discussion. I will post these readings on Canvas.

Optional: There is a wealth of free online 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***. If you are interested in producing beautiful and informative graphs or maps, I highly recommend Kieran Healy's **Data Visualization: A Practical Introduction**.

Course Structure

Grading

I will award grades based on your relative performance in the class, as determined by the following weights:

Exercises	20%
Problem Sets	20%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam	20%

Lab & Exercises

In your weekly lab section, you will learn to apply the concepts discussed in lecture using R. You are asked to complete several short fill-in-the-blank exercises that cover what you've learned at the end of each lab section. Then **by every Wednesday 11:59 p.m.** you are expected to submit the completed exercise knitted in **html document** on Canvas. Since most of these exercises may be also directly applicable to computational components of the problem sets, I strongly encourage students to attend the lab. ~~Due to space constraints, you must attend the lab for which you registered~~.

Problem Sets

I will assign **four** problem sets throughout the quarter. Each problem set will include an analytical component and a computational component.

- You can check out the tentative due date for each problem set here.
- You will turn in an **electronic copy** of each problem set on Canvas.
- Presentation matters. You can earn bonus points for producing professional work (*e.g.*, clear language, typed equations, tasteful fonts, tables and graphs with informative labels, *etc.*).
- I will drop your lowest problem set score.

I encourage you to work together on the problem sets. Unless explicitly stated, **each student is required to write and submit independent answers**. I will take word-for-word copies as evidence of academic dishonesty. If you work with others, list their names at the top of your assignment. If you fail to list your collaborators, you will receive a score of zero.

Exams

This course will have three exams throughout the term, two midterms and one final. **Midterm I** will be held **in-class on Wednesday, January 26th**. **Midterm II** will be held **in-class on Wednesday, February 23rd**, and **the final exam** will be held on **Friday, March 18th, at 10:15 a.m. - 12:15 a.m.**. For each exam, I will generate a randomized seating chart. During the exams, you may use a writing utensil, a non-programmable calculator, and a 3-by-5-inch notecard. As you turn in your exam, I will ask you to present your student ID. I do not give makeup exams. See the course policy on makeup assignments for more information.

Course Policy

Late Policy

I will use the Canvas automatic late penalty function to deduct five percent per hour that is submitted after the deadline. Please note that Canvas automatic late penalty function rounds up to the nearest hour, and thus one minute late is considered to be equivalent to an hour late. Make sure you have that information in mind when you submit your work after the deadline. If you turn it in after I post the key, you will receive a zero.

Makeup Assignments

I do not give makeup assignments. This blanket ban extends to exams. In extreme circumstances that lead you to miss one of the midterm exams—such as death in the family or grave illness or injury—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, provide documentation that your absence was due to extreme circumstances, and complete a qualifying assignment.

Grade Appeals

You must submit any request for re-grading in writing within one week of the day grades are posted for the problem set or exam in question. Your request should include a cogent argument explaining why your responses warrant full credit.

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. As a final note, a growing body of evidence suggests that using laptops in lecture reduces comprehension and recollection. In light of this evidence, I ask that you refrain from using your laptop during lecture. As a practical matter, it is much easier to write math by hand than it is to type it.

Academic Integrity

I will not tolerate cheating, plagiarism, and other violations of the Student Conduct Code. If I catch you 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*.

Academic Disruptions

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas. In the event that I have to quarantine, this course may be taught online during that time.

COVID-19 Policy

All students are required to wear masks indoors. In order to keep the learning environment as COVID-safe as possible, individuals who refuse to wear a mask or refuse to adjust their masks correctly will be asked to leave. I highly recommend students to take a time to read thoroughly below and visit UO COVID containment plan to learn how the University of Oregon is responding to contain COVID on campus and in classrooms. I would ask students to follow this toolkit as close as they can.

Prevention: To prevent or reduce the spread of COVID-19 in classrooms and on campus, all students and employees must:

- Comply with vaccination policy
- Wear face coverings in all indoor spaces on UO campus
- Complete weekly testing if not fully vaccinated or exempted
- Wash hands frequently and practice social distancing when possible
- Complete daily self-checks
- Stay home/do not come to campus if feeling symptomatic
- If you have mild viral symptoms that do not require medical attention and you have not tested positive for COVID in the previous 90 days, students can drop by UHS to get a free COVID-19 self-test kit to more quickly determine if you have Covid
- Complete the UO COVID-19 case and contact reporting form if you test positive or have been in close contact with a confirmed or presumptive case.

Containment: If a student in class tests positive for COVID-19:

- Follow guidance in classroom notification email if sent to an entire class

- Answer the call if contact by the Corona Corps (541-356-2292)
- Isolate if you test positive or are symptomatic
- Quarantine if you are an unvaccinated close contact or a vaccinated close contact with symptoms
- Test weekly if you are unvaccinated or partially vaccinated
- Stay home if symptomatic and complete the UO COVID-19 case and contact reporting form

Good Classroom Citizenship

- Wear your mask and make sure it fits you well
- Stay home if you're sick
- Get to know your neighbors in class, and let them know if you test positive
- Get tested regularly
- Watch for signs and symptoms with the daily symptom self-check
- Wash your hands frequently or use hand sanitizer
- Complete the UO COVID-19 case and contact reporting form if you test positive or are a close contact of someone who tests positive.

Support: The following resources are available to students.

- University Health Services or call (541) 346-2770
- University Counseling Center or call (541) 346-3277 or (541) 346-3227 (after hrs.)
- MAP Covid-19 Testing
- Corona Corps or call (541) 346-2292
- Academic Advising or call (541) 346-3211
- Dean of Students or call (541) 346-3216

Tentative Schedule

Lectures and Exams

Week	Date	Topic	Reading
01	01/03	Introduction	
01	01/05	Statistics Review I	ItE Review
02	01/10	Statistics Review II	ItE Review; MM 1 (appendix)
02	01/12	The Fundamental Econometric Problem	MM 1
03	01/17	No Class (Martin Luther King, Jr holiday)	
03	01/19	The Logic of Regression	MM 2
04	01/24	Midterm I Review	
04	01/26	**Midterm Exam I: High Concepts** (in-class)	
05	01/31	Simple Linear Regression: Estimation I	ItE 1
05	02/02	Simple Linear Regression: Estimation II	ItE 1
06	02/07	Classical Assumptions	ItE 2
06	02/09	Simple Linear Regression: Inference	ItE 2
07	02/14	Multiple Linear Regression: Estimation	ItE 3, 6.2; MM 2 (appendix)
07	02/16	Multiple Linear Regression: Inference	ItE 3, 6.3; MM 2 (appendix)
08	02/21	Midterm II Review	
08	02/23	**Midterm Exam II: The Weeds** (in-class)	
09	02/28	Categorical Variables	ItE 5
09	03/02	Interactive Relationships	ItE 4
10	03/07	Nonlinear Relationships	ItE 4
10	03/09	Final Review	
11	03/18	**Final Exam** (see final exam schedule)	

Subject to change!

Due Dates

Week	Date	Topic
01	01/05 (Wed)	Lab 1: Introduction to `R` and `RStudio`
	01/07 (Fri)	**Exercise 1** (due on Canvas by 11:59pm)
02	01/12 (Wed)	Lab 2: Introduction to the `function`
		Exercise 2 (due on Canvas by 11:59pm)
	01/14 (Fri)	**Problem Set 1** (due on Canvas by 11:59pm)
03	01/19 (Wed)	Lab 3: Data structure, preparation, and variable types
		Exercise 3 (due on Canvas by 11:59pm)
04	01/26	No Lab (Midterm I)
05	02/02 (Wed)	Lab 4: Data manipulation, visualization, and regression
		Exercise 4 (due on Canvas by 11:59pm)
	02/04 (Fri)	**Problem Set 2** (due on Canvas by 11:59pm)
06	02/09 (Wed)	Lab 5: Recap lab 1 - lab 4
		Exercise 5 (due on Canvas by 11:59pm)
07	02/16 (Wed)	Lab 6: Multiple regression and categorical variable
		Exercise 6 (due on Canvas by 11:59pm)
	02/18 (Fri)	**Problem Set 3** (due on Canvas by 11:59pm)
08	02/23	No Lab (Midterm II)
09	03/02 (Wed)	Lab 7: Omitted variable bias, interaction term
		Exercise 7 (due on Canvas by 11:59pm)
	03/04 (Fri)	**Problem Set 4** (due on Canvas by 11:59pm)
10	03/09 (Wed)	Lab 8: Final review
		No Exercise Due
	03/18 (Fri)	Final