

# ECO372H1F: Data Analysis and Applied Econometrics in Practice

## Section L0201 — Fall 2024

Department of Economics, University of Toronto

### Instructor

*Name:* Sean Elliott

*Email:* sean.elliott@mail.utoronto.ca

### Class information

*Lecture:* Monday from 5 PM to 7 PM in [See ACORN for room number]

*Tutorial:* Monday from 7 PM to 8 PM in [See ACORN for room number]

*Office Hours:* Friday from 12:30 PM to 2 PM in GE 213 or by appointment.

*Website:* Quercus ([Link](#))

### Course description

ECO372 is an intermediate-level course in econometrics which equips students with a modern approach to data analysis and econometrics focusing on the use of data to answer causal questions. Students will learn about different empirical techniques that economists use to do so: random assignment, linear regression, difference-in-differences, regression discontinuity design, and instrumental variables. Students will learn about applications of these techniques in academic research. Econometric methods will be illustrated using the application of regressions to a wide variety of economic questions and data sources, including the use of statistical software (R).

### References

We will be following Scott Cunningham's book, *Causal Inference: The Mixtape*, quite closely albeit, in a slightly different order than that which is presented in the book. It is freely available online or a physical copy may be purchased from Amazon or other retailers. We will also be looking at journal articles which illustrate the concepts we are learning in class. I will post these articles on Quercus. I have also listed a few additional textbooks which serve as supplementary reading for the topics in Cunningham's book. However, they are not required.

- **Required:** *Causal Inference: The Mixtape* by Scott Cunningham (<https://mixtape.scunning.com/>)
- **Supplementary:**
  - *Mastering 'Metrics* by Joshua Angrist and Jörn-Steffen Pischke (Princeton University Press, ISBN:978-0-691-15284-4)
  - *Introduction to Econometrics*, 4th Edition by James H. Stock and Mark W. Watson
  - *Introductory Econometrics: A Modern Approach*, 7th Edition by Jeffrey M. Wooldridge

### Software

We will be using the programming language R and the integrated development environment RStudio in this course. No prerequisite programming knowledge is required. Both R and RStudio can be downloaded and installed by following the instructions at this link: <https://posit.co/download/rstudio-desktop/>.

### Weekly schedule

I will post all materials on our course webpage ([Quercus](#)) on **Monday evening after class** for the next week's lecture. This includes the required readings, lecture slides, practice problems, along with any code and data you may need for the week's material. I encourage all of you to come to the lecture prepared by going through the readings *ahead* of time.

- **Lectures:** In our weekly lecture I will introduce the econometric theory and show you examples, by way of economic research, of the theory being used in practice. You will want some way to take notes and you should also bring a device which you can use to access R/RStudio. I will often show examples of code in class and for you to get the most out of this you should follow along in real time.
- **Tutorials:** In the tutorial time slot we will be working through the practice problems. These problems will include some theory and working with data in R. As such, you need some way to access R/RStudio during this session. In some cases, this will not take up the entire session and the remaining time will be used for office hours and open Q&A.
- **Office Hours:** There are weekly in-person office hours where you can either ask questions about the theory or get help with R. I will also schedule additional office hours before exams. If you are unable to attend the scheduled office hours and you need to talk to me, this can be arranged by sending me an e-mail.

## Course coverage

This is the tentative plan for the material.

Topic		Textbook chapter(s)
1	Introduction, probability, and regression	Chapters 1 & 2
2	Causality, potential outcomes, and selection bias	Chapters 3, 4, & 5
3	Regression discontinuity design (RDD)	Chapter 6
4	Panel data, difference-in-differences (DiD)	Chapters 8 & 9
5	Instrumental variables (IV)	Chapter 7

The textbook chapters will be supplemented with journal articles which I will post on Quercus with each week's lecture materials. Also, I will let you know each week which sections of the textbook are particularly relevant for us.

## Course evaluation

Your final grade will be based on the following:

Assessment	Weight	Due Date
In-class participation	5%	NA
Assignments (3 in total)	25%	Oct 11, Nov 8, and Nov 29 (at 11:59 PM)
Midterm exam	25%	October 21 (in class)
Final exam	45%	TBA (Possible dates are December 6 - 23)

- **In-class participation:** Participation is calculated based on you answering various polls and questionnaires I will run during the lectures. You will not be graded on the correctness of your responses—only your participation matters. I will exclude one lecture—out of our 12 meetings—when calculating this grade and there is no participation component in the first lecture.

- **Assignments:** You will have three assignments each weighted equally. These will be a combination of theory and code. I will require you to hand in both typed answers and a code replication package. The submission will be online and you will have until 11:59 PM of the day it is due to submit. However, try not to submit too close to the deadline—see the late assignment submission policy below. You are free to collaborate with one another on these but you must hand in your own version of the answers written in your own words.
- **Midterm/Final** A 2 hour midterm will be held on October 21 during class. The final will be 2 hours long with the date TBA. Both exams will consist of short-answer questions. Practice exams with solutions will be provided for both.

You may use **generative AI** to help you debug your code or to answer questions about high-level concepts covered in the course. However, you should be careful with this. I have noticed that AI can often give you misleading information regarding causal inference and statistics, in general. Additionally, any written work you submit must be your own and may not include any content from generative AI. Including text (not code) generated by AI in your assignment submissions constitutes the use of an unauthorized aid and is considered an academic offence. I want to encourage you to use these tools for what they are good at—generating code syntax—and discourage you from using them for what they are bad at—explaining model results.

### Remark requests

There will be an MS Form posted on the course webpage where you can go to request a remark of any submitted work. The entire submission will be remarked and your mark could go up or down. Any remark requests must be made within one week of the graded assessment being returned to you.

### Missed work/late submission

Any **missed work** (assignment or exam) automatically gets a grade of zero. Special considerations can be made for *legitimate* reasons as long as they are communicated to me by e-mail in **advance** of the due date. In the case of a missed midterm exam, there will be an opportunity to write a make-up exam within one week of the original exam date under two conditions:

1. You communicate your absence to me via e-mail **in advance** of the midterm.
2. You submit documentation which clearly outlines the reason for missing the midterm. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form.

If these conditions are not met, you will receive a grade of zero on the midterm exam and will **not** be eligible for writing the make-up midterm exam.

Note that **late assignment submissions** are also considered “missed” work and will be subject to the zero-grade penalty. Do not wait until the last minute to submit your assignments as there will be no leeway on this.

### Accessibility

If you require any additional accommodations or have any accessibility concerns, please reach out to Accessibility Services (<http://www.studentlife.utoronto.ca/as>) as soon as possible.