ECON265: Introduction to Econometrics
Spring 2025
Prof. Alam

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Lectures: JC106 on Tue & Thu at 9-10:15AM
Office Hours: JC222, Tue & Thu 10:30-11:30AM, or by appointment

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Lab/discussion sessions: Wed at 9-9:50AM and 4-4:50PM
Office Hours: JC201 on Mon & Fri at 10-11AM

Course description:

This course is an Introduction to Econometrics and is a required course for the Economics major. It is also highly recommended for Econ minors and in general, anyone who is interested in using data to understand the world around them better. Materials of ECON 160 (**pre-requisite course**) are expected to be well-understood by students. I recommend students to refresh their concepts of Econ 160 before we deep-dive into Econometrics.

In this course, we will learn concepts and techniques of *econometric methods* in economic analysis and implement them with real data. The empirical models we will build and use will be guided by intuition of economic models building foundational bridge connecting theory and empirics. Most of the course will focus working with *cross-sectional data*, with a small part towards the end dedicated to *panel data* methods. We will not cover methods related to time-series data in this course. This course will have a strong focus on working with data in R. Throughout the course, in parallel, we will be implementing the concepts learnt using R.

We will begin with a week of working with R, followed by introductory concepts of econometrics which initially will build and add mathematical formality to the concepts learned in ECON160, then dive into new econometric methods which deal with *causality*.

I want to emphasize that even though we will be using R heavily, the primary objective in this course is to learn econometric methods, while R is simply a tool to implement them. Hence throughout the course even though I will work with examples with you on R, I will in most cases point you towards resources for you to learn more by yourself since coding is just like learning any language---you will learn the best by practicing yourself. Thus, attending discussion sections with Zeyi---where you will be involved in coding primarily---will be equally important as attending lectures to do well in this course.

Textbook and references:

For the econometric methods only, the recommended textbook the 7th edition of "***Introductory Econometrics-A Modern Approach***" by Jeffrey Wooldridge. Older versions of the text are acceptable as well but please be aware that chapter numbers may not correspond exactly between different editions. You can also use the copies of the textbook available in the library on reserve. Before delving into the depths of the course materials cover in this course, students must go through **Math Refresher A** (Basic Mathematical Tools) **and B** (Fundamentals of Probability) from Wooldridge's textbook. However, this book specializes in teaching you econometric methods and not much into causality and econometric techniques for causality. For the causal part of the course, as a *reference textbook*, I recommend "***Mastering 'Metrics: The Path from Cause to Effect***" by Angrist and Pischke.

While working with data, we will mostly use the datasets available in the *wooldridge* package in R. These data will correspond to the textbook: the 7th edition of "***Introductory Econometrics-A Modern Approach***" by Jeffrey Wooldridge. See https://cran.r-project.org/web/packages/wooldridge/wooldridge.pdf for documentation on the package and associated data within. You will need to refer to it time and again as you will work through the problem sets and practices that we will do in class.

Finally, even though my primary objective is to teach you econometric methods, to start your journey on the path of becoming an expert of implementing them with real data, there are rarely "textbooks" that achieves everything in the best possible way. To that end, I will follow a combination of various open-source resources listed below that the authors have graciously allowed the academic community to use. Citations of resources I will be drawing from:

- *Statistical Inference via Data Science: A ModernDive into R and the Tidyverse* (2nd Edition) by Ismai, Kim and Valdivia.
    - Open-source available at: https://moderndive.com/v2/
- *R for Data Science (2nd edition)* by Hadley Wickham, Mine Çetinkaya-Rundel, and Garrett Grolemund.
    - Open-source available at: https://r4ds.hadley.nz/
- *Applied Statistics with R* by David Dalpiaz
    - Open-source project: https://github.com/daviddalpiaz/appliedstats
- *Introduction to Econometrics with R* by Oswald F, Viers V, Villedieu P, Kennedy G (2020)
    - Open-source project: https://scpoecon.github.io/ScPoEconometrics/
- *Data Science for Economists* by Grant McDermott
    - Open-source project: https://github.com/uo-ec607/lectures
- *Using R for Introductory Econometrics* (2nd edition) by Florian Heiss
    - Open-source available at: https://www.urfie.net/

Although this is not necessary, an advanced reading for interested students is ***Causal Inference: The Mixtape*** by Scott Cunningham. Open-source available at: https://mixtape.scunning.com/

More on coding with R:

We will use the open-source programming language R to implement the methods we learn in this course. We will write R code in an IDE (*integrated development environment*) called RStudio. Please ensure that both **R** and **RStudio** are installed in your machine following instructions posted in the 1st Canvas announcement.

If you have had no experience with any object-oriented programming language like R before, I recommend that, in the next three weeks, you start familiarizing yourself with the basics of R, even though I will spend the first week covering the basics. A programming language, like any other language, takes time to get used to. I don't want any student to fall behind just because of this—ultimately, the goal of the course is to build your knowledge and understanding of econometrics. There are several ways to get started:

- Getting started: Download and install R and download and install RStudio IDE. It is open-source and hence free to use.
    - For students unable to install RStudio, they can use **RStudio Cloud** as an alternative. It offers the same functionality as the desktop version and can be accessed directly at Posit Cloud. However, I strongly recommend having it up and running in our own machine, since access to RStudio Cloud will always require a stable internet connection and is only free for 25 hours/month.
- Explore resources in addition to those recommended above.
- Practice Regularly: Even just an hour a day will help you feel more comfortable with the basics.
- Join Study Groups: Collaborating with peers can make the learning process easier and more enjoyable.

Working with R or any programming language will be difficult initially with a steep learning curve, but it will pay off tremendously in the long run. This is not only because you will learn coding but the ability to implement complicated methods improves analytic and abstract thinking which is a very valuable in the labor market.

To make the most out of the course, I recommend:

- Most important is to ask questions whenever you are in doubt, regardless of what you think about the quality of your question.
    - There is no way you can learn unless you are willing to make mistakes.
    - I want to encourage you to **make mistakes early in class by asking questions**
        - Else probability of mistakes increases in exams
- Practicing data analysis in R regularly to build your skills.
- Keeping up with the readings and exercises to reinforce the concepts we cover in class.

Problem Sets:

Problem sets will be assigned most weeks. Since there will be a fair number of problem sets, and to allow me to post the solutions quickly on the webpage for the course, I will not accept late problem sets (see more on this under the "Policies" section).

Working format: All assignments will include **both** theoretical calculations, coding exercises requiring you to analyze data sets, and answer other questions based on intuition or on the underlying math of the econometric methods that you learn. To do all of them together in one single file, you will submit your solutions coded and typed up in a *R-notebook* file (.Rmd). Rmd files are designed to allow for code, the output of code and user typed text all in one file. It lets you develop code and record your thoughts by tightly integrating prose and code!

Submission on Canvas: As you will see in the first week, R-notebooks by themselves are hard to grade because the grader will need to download and run it on their own machine. So, after your R-notebook with your code and typed up answers are ready, you will "*knit*" it to a PDF which you will submit electronically on Canvas. Canvas will not allow you to submit any other file format. To knit to PDF you will first need to install a LaTeX distribution for your machine: MacTeX for macOS or MikTeX for windows. If knitting to PDF fails, you can knit to HTML and submit. Zeyi will discuss R-notebooks and "knitting" them to PDF in the first week in more details.

Expectation: Please make sure you describe **all steps** you took to get to the answers. You will not receive full credit if you only give the final answer (even if it's correct). You can discuss the problem set with your classmates, but you need code up your own file. If you're working with others, you must write their names in the authors section of your R-notebook.

Clarification/doubts on PS: If you have any questions about the problem sets, please reach out to Zeyi directly. Zeyi will be grading all the problem sets, and I want to ensure consistency in the guidance provided to all students on problem sets. By directing your problem set questions to Zeyi instead of me, we can avoid any potential differences in the advice given to students. Again, since Zeyi will grade, he will be keeping track of any late assignments. So, if you need an extension due to avoidable circumstances reach out to Zeyi.

Grading:

- 8 Problem Sets – 40% (5% each)
- Midterm exam – 25%
- Final exam – 30% (cumulative)
- Discussion session attendance – 5%
- No exceptions and no re-take of exams allowed

No collaboration will be allowed on exams.

Overall class grade algorithm:

A: 95-100%
A-: 90-94.9%
B+: 88-89.9%
B: 85-87.9%
B-: 80-84.9%
C+: 78-79.9%
C: 75-77.9%
C-: 70-74.9%
D: 60-69.9%
F: <60%

Engaged Learning Hours: Every one unit/free credit hour course at Clark University has 180 hours of associated engaged academic time. In this course, for the typical student, they may be divided as follows:

Class time:	42 hours (14 weeks x 3 hours)
Discussion session:	12 (12 classes x 1 hour)
Reading and class prep:	56 hours (14 weeks x 4 hour)
Problem sets:	40 hours (8 x 5 hours)
Studying for exams:	30 hours (3 x 10 hours)
Total:	180 hours

LEEP learning objectives: As part of the Economics curriculum, this course is designed to focus on these learning outcomes: 1) Knowledge of society: Economics focuses on the use of quantitative data to understand the economic aspects of society. This course helps you think about how those data are generated and provides you with tools to summarize and synthesize both the description of society and identify potential associations between social phenomena (for example, between education and income). 2.) Intellectual and practical skills: This course is all about data: learning rigorous methods to distinguish correlation from causation and thinking about what is "real" (the data generating processes) and what is due to chance and then using statistical methods to draw conclusions from it.

POLICIES

Late work policy:
Please note that all assignments should be uploaded to Canvas **before** the due date. If you need an extension for an assignment you need to email Zeyi (zeqian@clarku.edu) **and ask for an extension at least 48 hours before the assignment is due**. Once the 48-hour timeline before the assignment is due is past, **no requests** will be accepted. This will ensure that you can plan to work on the assignments in advance and allow Zeyi to post the solutions promptly on Canvas. If you anticipate **substantial** difficulty meeting a deadline, please reach out to me in advance to request the problem set early, allowing you additional time to complete it.

Objective specific emails for efficiency/ Email policy:

Task	*Whom to email*
Extension requests on PS	Zeyi
Course content	Moshi / Zeyi / both
Question on the PS	Zeyi
Coding questions	Zeyi

AI Usage:
I want to encourage students to **efficiently use AI for coding**. The word **efficient** is important here. This means that over the course of the semester as you learn econometric methods in class:

i. you learn and pick up coding mostly on your own,
ii. discover your own coding style (everyone has one),
iii. implement it,
iv. make mistakes,
v. and learn from where you are making mistakes.

Efficient use of AI is *mostly* using it in the first and the last steps (underlined), not in the step when you are implementing an econometric method for the first time in code. This is because the AI will make mistakes, and for you to catch that over time requires your knowledge base to be strong which can monitor mistakes made by the AI. This will become even more important as you accumulate more knowledge and specialized skills.

What I do not want is that you copy paste your assignment into a LLM and have it produce the solution for you. Even though I cannot monitor you, I trust that you will not do it for two reasons:

1. If you completely depend on AI, then you will lose the opportunity to build your skill and knowledge. This will hurt your labor market opportunities.
2. In the exam, for many questions I will ask you to write pseudo-code. Completely depending on AI will mean that you will not learn the language and will not be able to write (your own style of) logical pseudo-code in the exam, which is distinguishable from those have the knowledge of the language and use AI to learn from their mistakes thereby improving their knowledge base.

Academic integrity:
All students are expected to adhere to Clark's standards of academic integrity; this means that all work must be entirely your own and entirely unique to this course. Plagiarism and other forms of cheating will not be tolerated or excused. For more information, please refer to the university's policy on this issue, available at https://catalog.clarku.edu/content.php?catoid=32&navoid=2735#academic-integrity or in the student handbook. If you have any questions about proper citation or other related issues, please don't hesitate to come see me.

Students with Disabilities:
Clark University is committed to providing students with documented disabilities equal access to all university programs and facilities. Students are encouraged to register with Student Accessibility Services (SAS) to explore and access accommodations that may support their success in their coursework. SAS is located on the second floor of the Shaich Family Alumni and Student Engagement Center (ASEC). Please contact SAS at accessibilityservices@clarku.edu with questions or to initiate the registration process. For additional information, please visit the SAS website at: https://www.clarku.edu/offices/student-accessibility-services/

Title IX:
Clark University and its faculty are committed to creating a safe and open learning environment for all students. Clark University encourages all members of the community to seek support and report incidents of sexual harassment to the Title IX office (titleix@clarku.edu). If you or someone you know has experienced any sexual harassment, including sexual assault, dating or domestic violence, or stalking, help and support is available.
Please be aware that all Clark University faculty and teaching assistants are considered responsible employees, which means that if you tell me about a situation involving the aforementioned offenses, I must share that information with the Title IX Coordinator, Brittany Brickman (titleix@clarku.edu). Although I have to make that notification, you will, for the most part, control how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.
If you wish to speak to a confidential resource who does not have this reporting responsibility, you can contact Clark's Center for Counseling and Professional Growth (508-793-7678), Clark's Health Center (508-793-7467), or confidential resource providers on campus: Prof. Stewart (als.confidential@clarku.edu), Prof. Palm Reed (kpr.confidential@clarku.edu), and Prof. Cordova (jvc.confidential@clarku.edu).

FERPA:
The link to Clark's policy regarding student privacy under the Family Education Rights and Privacy Act is available here: https://www.clarku.edu/offices/security-and-identification-protection/ferpa/

Disclaimer: The instructor reserves the right to make changes to any information contained in this syllabus at any time during the semester. Changes will be announced, and an updated version of the syllabus will be posted on Canvas and/or distributed to students.