

Econometrics (Econ 308)

Department of Economics
William & Mary

Instructor: Andra Hiriscau

Summer, 2025

Office: Chancellors 464

Office Hours: Tu-Th 2:20 pm- 3:20 pm
or by appointment

Class Hours: M-Tu-W-Th 12:20 pm- 2:10 pm

Classroom: Chancellors 123

E-mail: ahiriscau@wm.edu

Course Description and Purpose

This course is an undergraduate-level introduction to econometrics. In the first part of the course, you will study and apply regression analysis to various data sets to understand the core concepts of estimating economic parameters, predicting economic outcomes, and statistical inference. The second part of the course will focus on causal inference, which sets economists apart from statisticians or data scientists. The ability to draw causal conclusions from data is a skill that graduate schools and potential employers highly value.

Learning Outcomes and Objectives

By the end of this course, you will be able to:

1. Discuss the basic assumptions of the classical linear regression model and identify and correct (if possible) any violations of these assumptions.
2. Understand why correlations, particularly in observational data, are unlikely to reflect a causal relationship.
3. Estimate and inference linear regression models.
4. Explain heteroskedasticity, multicollinearity, omitted variable bias, and endogeneity.
5. Write an empirical econometric analysis.
6. Present journal articles.

Prerequisites

The course catalog outlines ECON 101, ECON 102, ECON 307 as prerequisites. Students may use BUAD 231, MATH 106, MATH 351, or SOCL 353 in place of ECON 307 as a prerequisite for ECON 308, but these courses do not count as credit hours toward the Economics major. Having a solid background in statistics will be helpful. We will discuss specific topics in more detail.

Course Materials

The **reference** text for the course will be [Introductory Econometrics: A Modern Approach](#), 7th edition, by Jeffrey M. Wooldridge. The e-book can be rented for a reasonable price. **Older editions are equally suitable for this class.** I will post slides, on Blackboard, which follow the material in the textbook.

In addition to this textbook and slides, we will use the following materials, which are available for *free*:

- [Mixtape: Causal Inference](#) by Scott Cunningham
- [The Effect: An Introduction to Research Design and Causality](#) by Nick Huntington-Klein
- [R for Data Science](#) by Hadley Wickham Garrett Golemund.

Software

This course will rely on [R Studio Software](#) during classes. We will be working out examples using the software. Moreover, you will be using it for your homework assignments and project. R Studio is a free and open-source software for data science, scientific research, and technical communication. Instructions and videos on installing R Studio and using R Markdown are posted on the Blackboard.

Grading Policy

All of your grades will be posted on Blackboard, allowing me to keep you informed on your progress in the course. If you think you have any questions or concerns about your grade, be sure to get in touch with me immediately. Your grade will be calculated using the following proportions:

- 30% of your grade will be determined by in-class midterm exam
- 35% of your grade will be determined by the **cumulative** final exam
- 15% of your grade will be determined by homework assignments
- 5% of your grade will be determined by the Journal Article Presentation
- 15% of your grade will be determined by the Group Project

If your score for the final exam is higher than your score for the midterm, then I will replace your midterm exam score with the final score.

Table 1: Sample Grading Scheme

Grade	Range	Grade	Range	Grade	Range
A	93%- 100%	B-	80%- 82.99%	D+	67%- 69.99%
A-	90%- 92.99%	C+	77%- 79.99%	D	63%- 66.99%
B+	87%- 89.99%	C	73%- 76.99%	D-	60%- 62.99%
B	83%- 86.99%	C-	70%- 72.99%	F	less than 59.99%

Course Structure

Class Structure

- The class is meeting face-to-face four times a week for 110 minutes. A 10-minute break is scheduled after the first 50 minutes of class.
- All course materials will be posted on Blackboard. Make sure you check it often. I will post lecture slides, videos, assignments, answer keys, and announcements on the page.

Homework

- Homework will be distributed on Gradescope one week before the due date.
- There will be 4 homework assignments.
- You need to use [R Markdown](#) to write your code and results.
- We will be using Gradescope this term, which allows me to provide fast and accurate feedback on your work. Homework will be submitted through Gradescope (on Blackboard, access the Homework tab). As soon as grades are posted, you will be notified immediately so you can log in and see your feedback. You may also submit regrade requests if you feel I have made a mistake.
- After you have the PDF of your work, you will need to submit it through Gradescope. This [video](#) explains how to submit the PDF.
- Homework assignments will consist of two types of problems. The first type will involve mathematical derivation, and the second type will involve more data analysis using the R software.
- I encourage you to consult with your classmates, but each student needs to submit their homework individually.

Topics

Week	Day	Topic	Required Readings	Recommended Readings
Week 1	Monday, June 30, 2025	Syllabus Overview Research Project		The Effect: Chapter 1 and 2 The Effect: Chapter 3 and 4
	Tuesday, July 1, 2025	Review probabilities and statistics The Simple Regression Model: Overview	Math refresher A and B; Chapter 2.1	Mixtape: Chapter 2 The Effect: Chapter 13
	Wednesday, July 2, 2025	Deriving the Ordinary Least Squares (OLS) Estimators Properties of OLS on Any Sample of Data	Chapter 2: 2.2 Chapter 2: 2.3	
	Thursday, July 3, 2025	Units of Measurement and Functional Form Expected value and Variance of the OLS Estimator	Chapter 2: 2.4 Chapter 2: 2.5	
	Monday, July 7, 2025	NO CLASS (Appreciation Day)		
Week 2	Tuesday, July 8, 2025	The Multiple Regression Model: Estimation The Multiple Regression Model: Estimation	Chapter 3: 3.1, 3.2, 3.3 Chapter 3: 3.4, 4.6	Assignment 1
	Wednesday, July 9, 2025	The Multiple Regression Model: Inference The Multiple Regression Model: Inference	Chapter 4: 4.1, 4.2 Chapter 4: 4.3, 4.4, 4.5	
	Thursday, July 10, 2025	The Multiple Regression Model: Further Issues The Multiple Regression with Qualitative Information	Chapter 6: 6.1, 6.2 Chapter 7: 7.1	
	Monday, July 14, 2025	The Multiple Regression with Qualitative Information The Multiple Regression with Qualitative Information	Chapter 7: 7.2, 7.3 Chapter 7: 7.4, 7.5, 7.7	
Week 3	Tuesday, July 15, 2025	Heteroskedasticity Heteroskedasticity	Chapter 8: 8.1, 8.2, 8.3 Chapter 8: 8.4	Assignment 2
	Wednesday, July 16, 2025	Midterm		
	Thursday, July 17, 2025	Potential Outcomes Causal Model Potential Outcomes Causal Model	Mixtape: Chapter 4 Mixtape: Chapter 4	
Week 4	Monday, July 21, 2025	Simple Panel Data Methods Difference-in- Difference	Chapter 13: 13.1, 13.2 Mixtape: Chapter 9	The Effect: Chapter 18 Assignment 3
	Tuesday, July 22, 2025	Difference-in- Difference Synthetic Control	Mixtape: Chapter 9 Mixtape: Chapter 10	
	Wednesday, July 23, 2025	Advance Panel Data Methods Fixed Effects	Chapter 14: 14.1, 14.2 The Effect: Chapter 16	
	Thursday, July 24, 2025	Regression Discontinuity Regression Discontinuity	Mixtape: Chapter 6 Mixtape: Chapter 6	The Effect: Chapter 20
	Monday, July 28, 2025	Instrumental Variables Estimation and Two Stage Least Squares Instrumental Variables Estimation and Two Stage Least Squares	Chapter 15: 15.1, 15.2, 15.3 Chapter 15: 15.1, 15.2, 15.4	The Effect: Chapter 19
Week 5	Tuesday, July 29, 2025	Instrumental Variables Project Feedback	Mixtape: Chapter 7	Assignment 4
	Wednesday, July 30, 2025	Journal Article Presentations		
	Thursday, July 31, 2025	Final Exam		

Exams

- There are two exams in total. You are required to take all the exams at the scheduled time. All exams are hard-copied exams taken in class.
- The cumulative final exam covers all topics in the course but will emphasize the material that was covered in the later part of the course.
- In addition to multiple choice questions, the exams will focus on interpreting empirical results from tables and calculating certain statistics.
- I will provide samples of midterms and final exams.
- Make-up exams: There will be no make-up exams unless you have a university-sanctioned schedule conflict. Please notify me at least two weeks before the exam if you have a schedule conflict.

Group Project

You will have the opportunity to write a research paper using [IPUMS data](#). I will provide you the following [RMarkdown](#) file, where you will write your code, report the results, and summarize your findings. The due date for the project is midnight, August 3rd.

Group work can be highly beneficial for learning since students learn from each other and get superior motivation. Moreover, group work creates skills essential for students' future careers: teamwork is a typical work environment. I recommend that students form groups of two to three people to work together on problem sets and the project. You can register your group *team* in the Excel spreadsheet (available [here](#)).

Students are free to change the group, split the group, or start working alone at any time (after giving others a notice a week before the next deadline). Please view group work as your resource and learning opportunity, not a must.

Group members may have different grades on this project. The instructor's score counts 70% of your project's grade ([grading rubric](#)). In addition, your team members will grade your work on this project (20% of grade) and you will self-evaluate your work (10%) using the following [grading forms](#).

Journal Article Presentation

I will post research papers on different topics: education, labor, crime economics, gender economics, etc. Each group needs to choose one paper and present it. If your group wants to present a paper that uses differences-in-differences, instrumental variables, or regression discontinuity as an estimation strategy other than the ones I listed, please email me the paper so I can approve it.

You will use RMarkdown to create the slides, and the final presentation is on the last day of class, **July 30th**, during class time. The presentation should not be longer than 15-20 minutes, including the time for questions from the audience. The presentation will be graded according to the following: [grading rubric](#).

Tips on being successful in this course

- Before each class: skim the notes from the previous meeting, and after each class: read the book section assigned.
- Ask questions. If you do not seek my help, it is difficult for me to help you.
- Make sure you complete the homework since they are the best practice for the exams.
- Have R running on your computer during the class (or sit next to someone who does).
- Close your email and Internet entertainment and disable all other electronic distractions during class.

Policies

Office Hours

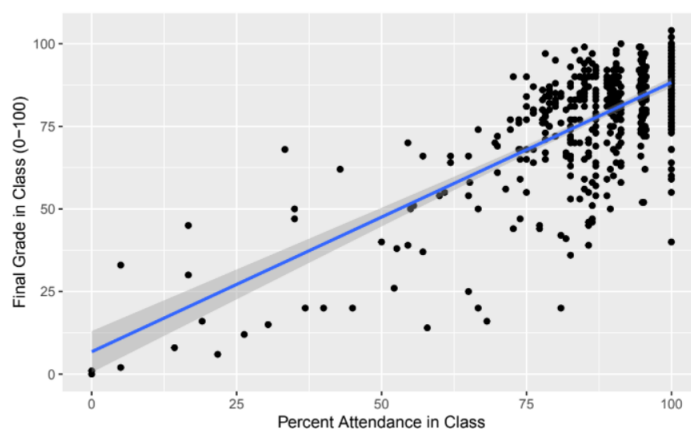
My office hours are on Monday and Wednesday from 2:20 pm- 3:20 pm. Office hours represent an opportunity to discuss any special needs or challenges you face.

Academic Integrity and Honesty

Students are required to comply with the William & Mary College policy on academic integrity found in the [The Honor Code](#). Cheating in exams, homework, or any other assignment will not be tolerated. Students found cheating on an exam will be given a score of 0 and will not be replaced with the final exam grade. In addition, they will be reported to the relevant authorities of the university.

Attendance Policy

Attendance is not a graded component of the course; however, it is expected that you attend all lectures. It is particularly important for this summer course as new material will be presented every day for four days a week. See below the strong correlation between class attendance and final grade.



Accommodations for Disabilities

William & Mary accommodates students with disabilities following federal laws and university policy. Any student who feels they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2512 or sas@wm.edu to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see [Student Accessibility Services](#).

Important Dates

July 3rd

July 18th

August 8th

Last day to add/drop

Last day to withdraw

Grades due