

William & Mary
Department of Economics
Econometrics (ECON 308)

Instructor: Enrique Valdes

Spring, 2023

E-mail: *Please use Blackboard "course messages" for anything concerning the course*

Any email with attachment email evaldes@wm.edu

Website: enriquevaldes.com

Class Hours: ECON 308-01 M, W, F 11:00 AM - 11:50 AM

ECON 308-02 M, W, F 12:00 PM - 12:50 PM

Class Room: Chancellor Hall, Room 113

Office Hours: M, W 9:00-10:50 AM, F 10:00am-10:50am, and F 1:00pm-2:00pm or by appointment

Office: Chancellors Hall 425

Course Description and Purpose

Course Description: This course is a survey of the econometric methods that are commonly used in economic research with emphasis on the application of these techniques rather than their theoretical development. 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 techniques used to try to make causal inferences.

Purpose: Why study econometrics? Econometrics provides us with a set of tools to test economic theories and better understand economic relationships. At times economic relationships found using these set of tools can lead to the development of new theories which help us better understand the world. A course of this nature gives you the tools to analyze data and being to start thinking about casual inferences. This ability to make casual inferences is a key skill that sets apart economist from statisticians and data scientist. The skills first acquired in this course, if developed properly, are highly valuable to potential employers. Even if you are not planning a career in economic research, you will be able to interpret economic research which can be useful in a variety of careers.

Learning Outcomes and Objectives

Upon successful completion of the course, the student should be able to do the following:

- Define the basic assumptions of the classical linear regression model.
- Identify and correct (if possible) any violations of basic assumptions of the classical linear regression model.
- Explain why a correlation is insufficient to imply a casual relationship, particularly in observational data.
- Explain heteroskedasticity, multicollinearity, omitted variable bias, and endogeneity.

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.

Course Materials

Textbook

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:

- [Using R for Introductory Econometrics, 2nd edition](#) by Florian Heiss (This book goes through all the examples in the Wooldridge text using R)
- [Mixtape: Causal Inference](#) by Scott Cunningham 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. Here is a good [video](#) on installing R and R studio

Course Structure

Class Structure

- The class is meeting face-to-face three times a week for 50 minutes per class.

COVID

- W&M students who test positive for COVID-19 need to isolate and not attend in-person classes for at least five days. Unvaccinated or unboosted students also quarantine if they are identified as close contacts. Visit the CDC's [Quarantine & Isolation Guide and Calculator](#) for information
- Helpful resources
 - CDC COVID website <https://www.cdc.gov/coronavirus/2019-nCoV/index.html>
 - [W&M COVID-19 Information](#)

Homework

- All homework will be distributed through Blackboard.
- There will be 6 homework assignments, and the lowest homework grade will be dropped. If you miss an assignment, it will count as your lowest assignment grade and will be dropped.
- 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.
- For the computer exercises 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.
- I encourage you to consult with your classmates, but each student needs to submit their homework individually.

Exams

- There are four exams in total. You are required to take all the exams at the scheduled time. All exams are hard-copied exams taken in class.
- All of the exams are cumulative but will focus on the material covered after the previous exam.

- The exams will have three types of questions multiple choice, short answer questions, and questions where you have to make calculations and write an interpretation.
- The first midterm exam is on February 27, 2023. You will have some questions from chapter 1 but the majority of the questions will come from chapters 2 and 3.
- The second midterm is on March 27, 2023. Around 25% of the questions will come from chapters 1-3 , and the other 75% of the questions will come from chapters 4-6.
- The third midterm is on April 17, 2023. Around 10% of questions will come from chapters 1-3, 15% of questions will come from chapters 4-6, and the other 75% of the questions will come from chapters 7-9.
- The final is cumulative, Around 65% of the questions will come from material covered in chapters 13, 14, 15 and 16, another 15% of the questions will come from chapters 7-9, 10% of the questions will come from chapters 4-6, and 10% of the questions will come from chapter 1-3.
- The final exam will last 2.5 hours, and we will start the exam at the beginning of the scheduled time. The exam time and date is set by the college and subject to change by the college. The most updated official date of the exam can be checked [here](#). Any individual request to change a scheduled exam must be approved by the Dean of Undergraduate Studies, click [here](#) for more details .
- **Make-up exams:** Unless you have a university-sanctioned schedule conflict there will be no make-up exams. If you think you have a university-sanctioned schedule conflict, please notify me at least two weeks before the exam. If you miss a midterm exam the final exam score will replace the missed exam score. If you miss a second midterm exam due to a **documented emergency** then we will deal with those situations on an individual basis. Any make-up exam will be different than the exam given in class. The level of difficulty will be more or less the same.

Group Project

In this class, you will have the opportunity to analyze, in R, the correlation between variables in a country of your choice. Data are available at [IPUMS International](#). I will provide you a RMarkdown file, where you will write your code, report the results and summarize your findings. The due date for the project is midnight, **May 5, 2023**. More details about the project will be posted on Blackboard.

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. You should form groups of three to four members. Students are free to change the group, split the group, or start working alone at any time (after giving others a notice a week ahead of the next deadline). Please view group work as your resource and learning opportunity, not a must..

Writing Resources: For a useful guide to writing see [Writing Tips for Ph.D. students](#). I realize you are not Ph.D. students, yet, there are some tips that can be used by undergraduates.

The Writing Resources Center, located on the first floor of Swem Library, is a free service provided to WM students. Trained consultants offer individual assistance with writing, presentation, and other communication assignments at any stage, from generating ideas to polishing a final product, and across disciplines. To make an appointment, visit the [WRC webpage](#).

Grading Policy

I will keep you posted on your progress in the course by posting your grades on Blackboard. If you have any questions or concerns about your grade, please contact me immediately. You should be proactive about your grades, and do not wait until the last minute.

Incomplete grade Policy Statement

A student who has not completed all work due to exceptional circumstances, may, with the consent of the instructor, temporarily receive a grade of incomplete ("I"). It is the student's responsibility to make arrangements with the instructor to complete the work by a specified date (first full week of the upcoming semester for deferred examinations). "I" automatically becomes "F" if the work is not completed by the last day of classes of the following regular semester, or if the postponed work has not been completed satisfactorily by the date specified by the professor.

Grade Calculation

The grade will be calculated using the following proportions:

- **50%** of your grade will be determined by midterm exams, (i.e. the first three exams, each worth 16.66% of your grade)
- **25%** of your grade will be determined by the final exam
- **15%** of your grade will be determined by homework
- **10%** of your grade will be determined by the project

$$\text{Final Grade} = (\text{Midterm average} * .50) + (\text{Final Exam} * 0.25) + (\text{Homework Average} * 0.15) + (\text{Group project} * .10)$$

Letter	Range	Letter	Range	Letter	Range
A	93.00 or above	B-	80.00- 82.99 %	D+	67.00- 69.99 %
A-	90.00-92.99 %	C+	77.00- 79.99 %	D	63.00- 66.99 %
B+	87.00-89.99 %	C	73.00- 76.99 %	D-	60 -62.99
B	83.00- 86.99%	C-	70.00- 72.99 %	F	59.99 or less

I reserve the right to curve the scale dependent on overall class scores at the end of the semester. Any curve will only make obtaining a higher letter grade easier.

Weekly schedule

The schedule is tentative and subject to change.

Week	Date	Section
1	January 25, 2023	Introduction to Course
	January 27, 2023	The Nature of Econometrics and Economic Data (Ch. 1)
2	January 30, 2023	The Nature of Econometrics and Economic Data (Ch. 1)
	February 1, 2023	The Simple Regression Model(Ch. 2), 2.1
	February 3, 2023	The Simple Regression Model(Ch. 2), 2.2
3	February 6, 2023	The Simple Regression Model(Ch. 2), 2.3
	February 8, 2023	The Simple Regression Model(Ch. 2), 2.4
	February 10, 2023	R tutorial, Bring laptop with R studio installed
4	February 13, 2023	The Simple Regression Model(Ch. 2), 2.5
	February 15, 2023	The Simple Regression Model(Ch. 2), 2.5
	February 17, 2023	Multiple Regression Analysis: Estimation (Ch. 3), 3.1 , 3.2a-e
5	February 20, 2023	Multiple Regression Analysis: Estimation (Ch. 3) , 3.2a-e, 3.2h
	February 22, 2023	Multiple Regression Analysis: Estimation (Ch. 3), 3.3,
	February 24, 2023	Multiple Regression Analysis: Estimation (Ch. 3), 3.4, 3.5
6	February 27, 2023	Exam #1
	March 1, 2023	Multiple Regression Analysis: Inference (Ch. 4) 4.1, 4.2, 4.3
	March 3, 2023	Multiple Regression Analysis: Inference (Ch. 4) 4.3, 4.4
7	March 6, 2023	Multiple Regression Analysis: Inference (Ch. 4) 4.5
	March 8, 2023	Multiple Regression Analysis: OLS Asymptotics (Ch. 5), 5.1a,5.2
	March 10, 2023	Multiple Regression Analysis: OLS Asymptotics (Ch. 5), 5.2
8	March 13, 2023	No Class (Spring Break)
	March 15, 2023	No Class (Spring Break)
	March 17, 2023	No Class (Spring Break)
9	March 20, 2023	Multiple Regression Analysis: Further Issues (Ch. 6) 6.1, 6.2
	March 22, 2023	Multiple Regression Analysis: Further Issues (Ch. 6) 6.2, 6.3a
	March 24, 2023	Multiple Regression Analysis with Qualitative Information (Ch. 7), 7.1, 7.2, 7.3
10	March 27, 2023	Exam #2
	March 29, 2023	Multiple Regression Analysis with Qualitative Information (Ch. 7), 7.4
	March 31, 2023	Multiple Regression Analysis with Qualitative Information (Ch. 7), 7.5
11	April 3, 2023	Heteroskedasticity (Ch. 8) 8.1, 8.2
	April 5, 2023	Heteroskedasticity (Ch. 8) 8.3, 8.4a-c
	April 7, 2023	Heteroskedasticity (Ch. 8) 8.4a-c, 8.5
12	April 10, 2023	More on Specification and Data Issues (Ch. 9), 9.1, 9.2a-b
	April 12, 2023	More on Specification and Data Issues (Ch. 9), 9.2a-b, 9.5a-c
	April 14, 2023	Pooling Cross Sections across time: Simple Panel Data Estimation (Ch. 13) 13.1, 13.2
13	April 17, 2023	Exam #3
	April 19, 2023	Pooling Cross Sections across time: Simple Panel Data Estimation (Ch. 13) 13.2, 13.3
	April 21, 2023	Pooling Cross Sections across time: Simple Panel Data Estimation (Ch. 13), 13.4, 13.5
14	April 24, 2023	Advanced Panel Data Methods (Ch.14), 14.1
	April 26, 2023	Advanced Panel Data Methods (Ch.14), 14.2
	April 28, 2023	Instrumental Variables Estimation and Two-Stage Least Squares (Ch.15), 15.1, 15.2
15	May 1, 2023	Instrumental Variables Estimation and Two-Stage Least Squares (Ch.15), 15.2, 15.3
	May 3, 2023	Instrumental Variables Estimation and Two-Stage Least Squares (Ch.15), 15.5
	May 5, 2023	The Nature of Simultaneous Equation Models (Ch.16), 16.1, 16.2, 16.3
16-17	May 8-12, 2023	Exam period
	May 15-16, 2023	Exam period

Key Dates

Classes start	Wednesday, January 25, 2023
Last day to add/drop	Friday, February 3, 2023
Spring Break (No Classes)	March 11-March 19, 2023
Last day to withdraw from a full-term course	Monday, March 27, 2023
Advising period	March 20-March 31, 2023
Last day of classes	Friday, May 5, 2023
Final exam periods	May 8-12 and May 15-16
Final grades due for graduating students	Thursday, May 18, 2023
Commencement	May 18-20, 2023
Final grades due for continuing students	Tuesday, May 23, 2023

Course Policies

Attendance Policy

- Class attendance is **required** for all scheduled class lectures. Invariably, students who miss classes fall to the bottom of the grading ladder. Reading the textbook is a complement to the lectures, not a perfect substitute for missing classroom lectures. The lectures may deviate from the textbook, and you can only be aware of the appropriate material if you attend the class. Some material in the textbook may be skipped in the lectures, while other material may be studied in more detail than is presented in the textbook. I will give examples, make clarifications, answer questions, and offer interpretations that may not be found in the textbook.

Policies on Late Assignments

Late assignments will not be accepted and under no circumstances will make-up homework be allowed. A student who fails to complete the homework before the due date will receive a grade of "0" for the respective assignment or quiz. Deadlines are strictly enforced and are detailed on Blackboard. Please be mindful of these dates, as they will not change.

I must be as fair as possible to everyone in this course. For that reason, I cannot accept late work. It would not be fair if some students are given extensions while others are not. Moreover, deciding who merits an extension would be an arbitrary process. There is no way of me knowing who is being honest with me and who is just trying to get an extension because they forgot to do their work. That being said to avoid all of these issues I have designed the course to take into account the fact that life happens and for whatever reason, you may miss an assignment or you have some issue where you do poorly on an assignment or test.

Here are the two main features of the course that are designed to help you just in case you miss assignments or do poorly on an exam

- Your lowest homework score will be dropped. That being said if you do miss a homework assignment it will not hurt your grade. However, if you miss more than one homework assignment your homework grade will suffer.

- As mentioned above, if you do better on the final exam than on one of the midterm exams the final exam score will replace the lowest exam score. Therefore, if you miss an exam the final will count twice and replace the missed exam grade.

Extra credit policy

- **Extra credit assignments** will not be given on an individual basis, **so do not ask**. If and when extra credit is given the entire class will have the opportunity to get it. Usually, extra credit opportunities are available during the class. If you do not attend class then you may miss the extra credit opportunity.

Technology policy

- I have a no laptop or cell phone policy. I find that although there are merits to taking notes on these devices they can cause a distraction. Sometimes even distracting those around you, which in economics is what we call a "negative externality" (You should have learned about this in your microeconomics course). Additionally, because my goal is to promote long-term retention of this material this is best done through taking notes with paper and pencil. Do not take my word for it look at the research below.
 - [Attention, Students: Put Your Laptops Away](#), NPR Article.
 - Mueller, P. A., & Oppenheimer, D. M. (2014). [The pen is mightier than the keyboard: Advantages of longhand over laptop note taking](#). *Psychological science*, 25(6), 1159-1168.
- I will allow students to use a tablet with a stylus to take notes. However, please make sure to sit towards the front row during class. If students are seen using the tablet for non-academic purposes during the class they will be asked to take notes with paper and pencil.
- I will remind you ahead of time to bring your laptop when we go over how to use R in class.

Email policy

Send all emails concerning anything going on in the course via Blackboard. Just click on the course messages link in Blackboard. Please use common courtesy when sending e-mails. Please allow 48 business hours for a response. E-mails will be checked periodically Monday-Friday from 9:00 AM – 5:00 PM. E-mails will not be checked on the weekends.

Classroom etiquette

- Arrive on time.
- No food or beverages except for water.
- Please silence cell phones during class.

- Please do not wear headphones during the lecture. If you have a legitimate reason you need to wear headphones please let me know.
- If you need to use your cell phone for any non-academic purposes during class (i.e. social media, texting, checking voicemails, phone calls, etc.) please step outside of the classroom to do so.
- Please be respectful during the lecture. Do not make it difficult for those around you to learn by having sidebar conversations.

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.

The pledge: "As a member of the William & Mary community, I pledge on my honor not to lie, cheat, or steal, either in my academic or personal life. I understand that such acts violate the Honor Code and undermine the community of trust, of which we are all stewards."

A note on AI-generated content

All work submitted in this course, whether in draft or final form, must be your own and must be cited appropriately. If you do use a natural language processing bots such as ChatGPT, please limit your use to gathering information and not completing your assignments. Additionally, any content you gather must be cited and you must fact-check all material, because AI-generated content often contains falsehoods and fictional sources. Submitted work may be reviewed, as needed, for AI-generated content. Moreover, any improper use of AI-generated content will be considered plagiarism, e.g., submitting an assignment generated from a natural language processing bot as your own.

This course is accessible to students with 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](#).

Mental and Physical Well-Being

William & Mary recognizes that students juggle different responsibilities and can face challenges that make learning difficult. There are many resources available at W&M to help students navigate emotional/psychological, physical/medical, material/accessibility concerns, including:

- The W&M Counseling Center at (757) 221-3620. Services are free and confidential.

- The W&M Health Center at (757) 221-4386
- For additional support or resources & questions, contact the Dean of Students at 757-221-2510.
- For a list of other [resources](https://tinyurl.com/wmmentalhealth). available to students, see <https://tinyurl.com/wmmentalhealth>



or:

Acknowledgement of Indigenous Peoples as the Historical Custodians of the Land at William & Mary

Like peer institutions around the country, William & Mary seeks formally to acknowledge the original Indigenous inhabitants of the state-owned land on which the Williamsburg campus resides, and has partnered with their present-day descendants to create appropriate language. After consultation and input from VA Tribal leaders in August 2020, President Rowe approved the following statement:

William & Mary acknowledges the Indigenous peoples who are the original inhabitants of the lands our campus is on today – the Cheroenhaka (Nottoway), Chickahominy, Eastern Chickahominy, Mattaponi, Monacan, Nansemond, Nottoway, Pamunkey, Patawomeck, Upper Mattaponi, and Rappahannock tribes – and pay our respect to their tribal members past and present.

For more information, please see <https://www.wm.edu/as/anthropology/research/centers/airc/land-acknowledgement/index.php>.

This Course was Designed with You in Mind

Main additional resources that will help you pass the course

- Office hours. Office hours are for you to come and ask questions about anything you are unclear about. Please come by during the specified times, you do not need to make an appointment.

Tips to being successful in this course

- Reading the chapter or going through the before class is necessary to understand the material.
- Take notes in class. Note-taking helps you process, organize, and retain information
- Vary the type of material studied in a single session. Improve your comprehension of challenging material by seeing it applied and presented in multiple ways.
- Ask questions, either during class or during office hours. If you do not seek my help it is difficult for me to help you.
- Make sure to complete the homework. It is the best practice for the exams.

- Space study time. Improve your comprehension of material by letting it sink in between multiple encounters with it.
- Practice drawing diagrams and writing equations. Don't just memorize images. Practice drawing them on your own while reading the textbook. Use diagrams and equations to think through new problems.
- Practice explaining economic concepts and logic. Talk about what you are learning to classmates, roommates, and family.
- The exams will challenge you to think critically so make sure to be prepared. An effective study strategy is to practice "recall", i.e. answering questions and checking if you got the question correct after you answered it. This can be done with flashcards or practice exams.

Some of the above tips were adapted from Bayer, Amanda, 2021. Diversifying Economic Quality. American Economic Association Committee on the Status of Minority Groups in the Economics Profession. <http://diversifyingecon.org>

This class's community is inclusive

Students in this class represent a wide variety of backgrounds and perspectives. I am committed to providing an atmosphere for learning that respects diversity and creates inclusive environments in our course. While working together to build this community, I ask you to:

- Understand that we are bound to make mistakes in this space, as anyone does when approaching complex tasks or learning new skills. Strive to see your mistakes and others' as valuable elements of the learning process.
- Understand that your words have effects on others. Speak with care. If you learn that something you've said was experienced as disrespectful or marginalizing, listen carefully and try to understand that perspective. Learn how you can do better in the future.
- Take pair work, or small group work seriously. Remember that your peers' learning is partly dependent upon your engagement.
- Understand that others will come to these discussions with different experiences from yours. Be careful about assumptions and generalizations you make based only on your own experience. Be open to hearing and learning from other perspectives.
- I welcome any feedback on how I could make the course more diverse and inclusive. Please reach out to me with your suggestions.

We use each other's preferred names and pronouns

Please let me know of your preferred or adopted name and gender pronoun(s), and I will make those changes to my records and address you that way in all cases.

I personally preferred to be called Enrique. If you want to refer to me as professor Valdes that is fine too.

Interested in a career in economics or in grad school?

It is never too early to start thinking about what to do after college. An undergraduate degree in economics offers many opportunities. Below are a few websites from the American Economic Association that provide great information about careers and graduate school.

- [American Economic Association student resources](#)
- [American Economic Association careers website](#)
- [American Economic Association graduate school information](#)

Please note: The syllabus is tentative and subject to change at the professor's discretion