Econ 385: Introduction to Econometrics

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Fall 2023

Office: Showker 6014
Class Room: Showker 0205
Class Hours: TuTh 2:20 - 3:35PM

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Office Hours
Location: Showker 6014
Tuesday 9:30-11:00AM & 1:10-2:10PM
Thursday 9:30-11:00AM & 1:10-2:10PM

Course Description and Objectives

This is an introductory course in Econometrics where students will learn quantitative techniques that are often utilized in economic analysis. One objective of this course is to build sufficient understanding of these techniques so that you will be able to replicate and interpret published journal articles in the field of Economics. We will begin with a brief review of calculus and statistics. This will be followed by the classical regression model, conditions under which such a model yield causal estimates of interest, and diagnostic analysis aimed at testing various assumptions underlying the classical regression model.

My expectations from the students taking this class are listed below.

1. Understanding the classical regression model and various assumptions made for generating empirically valid estimators from this model.
2. Develop an understanding of hypothesis testing as a tool for testing predictions of models based on economic theory.
3. Gain proficiency in the use of the statistical software *R*. For this purpose you will be required to work on several data projects and a research project. More details on these items will be provided later in this documents.

Course prerequisites and Catalog Description

This course discusses construction of models based on economic theory including identification of variables, development and testing of hypotheses for single- and multi-equation

systems. Prerequisite: "C" or better in ECON 200, ECON 201 and COB 191 or MATH 220 and MATH 205,MATH 231,MATH 235 or ISAT 151 and either ECON 284 (BA/BS majors) or COB 291 (BBA majors) or MATH 318.

Readings

- Lecture Notes: I have been developing a book for this course. The beta version is now available as an eBook and at present it is organized the same way as my lecture notes. You can access it from the following website:

  https://vipul-bhatt.github.io/Econ-385-Notes/

  Please note that this book is a work in-progress. I haven't even edited the whole document yet. So expect a lot of spelling mistakes and grammatical errors. I may add some material to the book during the semester.

- Supplementary Textbook: *Introduction to Econometrics (5^{th} Edition) by Christopher Dougherty. Oxford University Press*

  You can purchase this book from the Oxford University Press Website (see link below):

  https://global.oup.com/academic/product/introduction-to-econometrics-9780199676828?cc=us&lang=en&

  This book also has a lot of supplementary material available online at the Oxford University Press Website:

  http://global.oup.com/uk/orc/busecon/economics/dougherty5e/

- In addition we may use various published journal articles and other sources during the semester. Complete citation and/or pdf versions will be posted on Canvas in a timely fashion.

- Resources for the Statistical Software R:

  We will be using the statistical software called R extensively. R supports both Windows and Mac operating systems. You are expected to develop deeper understanding of R on your own using abundant resources available on R on the Internet. I have been working on a video course for learning basic R. These videos are available on Canvas. To access them go to **Modules** and view all the videos posted under **R Tutorials**.

Important Deadlines

	Date	Time	Location
Project: Progress Report	October 11th 2023	9:00PM	Canvas
Project: Final Report	November 29th 2023	9:00PM	Canvas
Midterm	November 2nd 2023	2:20-3:35PM	Showker 0205
Final	December 12th 2023	1:00-3:00PM	Showker 0205

Course Policy

Below I summarize important policies related to this course. Read them carefully and let me know in case you have a clarifying questions.

Grading Structure

A. Problem Sets	100
B. Replication Project	60
C. Midterm	100
E. Final Exam	140
Total	400

Details on Grading Items

- **Problem Sets:** During the semester you will be given several problem sets that are meant to provide practice problems for the material covered in class. Several of these problem sets will also involve applying methods learned in this class to real world data using R. I will be posting these problem sets on Canvas regularly and you will get sufficient time to complete them. You will be uploading your assignments as a single pdf file on Canvas. The exact number of problem sets will depend on how the semester progresses but the total contribution 100 points toward your final grade.

- **Replication Project:** During the semester you will be working on a replication project that will count for 60 points. Details on this assignment will be provided in a timely fashion via Canvas.
- **Midterm Exam:** There will be one midterm exam worth 100 points. The details about the exam format will be provided to you in a timely fashion.
- **Final Exam:** The comprehensive final examination will count towards the remaining 140 points of your final grade.

Make-up Policy

- There will be no make-up for missed problem sets. I will not accept late submissions for them either. No exceptions.
- There will be no make-up for missed replication project. I will not accept late submissions for it either. No exceptions.
- If you are not able to take the midterm exam during the assigned time, it is your responsibility to contact me AT LEAST a week in advance to discuss the appropriate solution. This rule applies to both the midterm exam as well as the final.
- There will be no make-up for the midterm exam. In the most extreme of circumstances I may decide to make an exception and shift the weight of the missed midterm to the final exam. However, this will depend solely upon my discretion and you would need to provide the appropriate and valid documentation to support your situation. If a student misses the exam, and does not furnish an acceptable official document, or if the student's excuse is not valid according to me regardless of the documentation, then the student will receive a grade of 0 for the midterm exam.
- For the Final exam, a make-up will be given if an acceptable official document such as a medical statement from a doctor is supplied as soon as possible. I will not accept any document after one week has passed from the date of the exam except under extreme circumstances. If a student misses the exam and does not furnish an acceptable official document, or if the student's excuse is not valid according to me regardless of the documentation, the student will receive a grade of 0 for the final exam and hence will fail this class.

Use of Canvas

Materials pertaining to the course such as important announcements, lecture slides etc will be posted on Canvas. It is your responsibility to keep a track of such announcements and postings on Canvas at\

https://canvas.jmu.edu/

You should check Canvas at least twice per week to stay abreast of the course.

Use of AI

A) Permitted use of AI

The use of generative AI tools such as ChatGPT is permitted with conditions. Here is a list of activities where you can use this resource:

a) Finding information on a particular topic
b) Checking grammatical errors in your work
c) Searching for a way of implementing a particular data analysis in R

Note that if you use such a resource, it is your responsibility to ensure that there are no errors in your work. You are also responsible for ensuring that it does not violate any intellectual property rights and does not contain misinformation. Saying that you obtained it from ChatGPT does not absolve you from the responsibility for ensuring that your work is error free and meets JMU's honor code policy. You must acknowledge use of such AI resource properly so that you meet the academic honesty standards set by JMU. Include a short paragraph in a footnote or maybe as an endnote explaining how you used AI for an assignment. In case of obtaining a code snippet for R or text generated from ChatGPT, use direct quotes or different color font so that I know how much of your work is generated by AI and what your contribution over and above this tool.

Here is a golden rule: when in doubt about permitted usage, ask me for clarification!

B) Non-permitted use of AI

The use of AI is not permitted in this course for the following activities:

a) Exams and quizzes
b) Writing a draft for your research project
c) Copying and pasting entire sentences, paragraphs, or papers to complete any class assignments.
d) Copying and pasting entire R code for an assignment. You can (after acknowledging and annotating) use ChatGPT for some portions of the code but using it to answer the entire assignment is not permitted.

Caution in using ChatGPT

I think of ChatGPT as a tool and like any tool, its effectiveness depends on how well you understand your problem and what kind of input you provide from your end to ChatGPT. Think of Google search—the effectiveness of this tool depends on the preciseness of your search phrase. Same thing is true for ChatGPT. Here are some tips in using ChatGPT in general:

1. ChatGPT requires a prompt from you. That is what you bring to the table. The importance of a refined and polished prompt cannot be overstated. The vaguer and more ill-informed your prompt is, the more gibberish you should expect from ChatGPT.

2. Like any other free internet resource, your default should be to always doubt the veracity and accuracy of anything ChatGPT produces, even factual statements or snippets of R code. Unless you know it to be error free yourself or can verify from

a credible third-party resource, assume that the information you have obtained will contain significant errors and would need your input to make it error free.

3. Your goal should be to save time and use of ChatGPT should allow you to improve your assignments in substantive ways using the freed up time. If that is not happening, and you are wasting a lot of time then maybe ChatGPT is not an appropriate tool for that assignment.

Withdrawing from the Class

- In case you wish to withdraw from the class please follow the University guidelines and make sure to meet the corresponding deadlines. These are available at:

  http://www.jmu.edu/syllabus//#AddingDropping

- If you miss the deadline for withdrawing with a grade of W then your grade will is based on your class performance. I DO NOT, in any circumstance give WP or WF, and I will not entertain any such requests.

Preferred method for contacting me

The best way to reach me is via email. I will do my best to respond to e-mail within 24 hours on a weekday, 48 hours on a weekend, according to the following policy:

- I will not reply to e-mails that request information that can be found on the syllabus and/or Canvas.
- Make your queries brief. I will only respond to questions that can be answered in a sentence or two. For detailed questions, please see me during office hours.

Inclement Weather Policy

Classes will be held unless canceled by the JMU administration for reasons of bad weather, bomb threats, or fire alarms.

JMU Honor Code Policy

All students are expected to be aware of and adhere to the JMU Honor Code. Students will be expected to be academically honest and properly credit all source materials used. For the official documentation on the honor code policy see:\

http://www.jmu.edu/syllabus//#Honesty

Other University policies

To read about JMU's policy regarding Adding/Dropping Courses Disability Accommodations, and Religious Observation Accommodations, please see:

http://www.jmu.edu/syllabus

Tentative Course Outline

I will try my best to follow the schedule outlined below. However, in all likelihood this schedule will change depending on how the class respond to each topic.

	Content and Readings
	Topic 1: Linear Regression Model • Statistical Motivation • Estimation Method: OLS • Interval Estimation and Hypothesis Testing Using Regression Models • Readings: – Lecture Notes: Ch. 1 and 2 – Dougherty Ch.1, 2, and 3
	Topic 2: Functional Form and Specification of Regression Model • Polynomials • Dummy Variables • Readings: – Lecture Notes: Ch. 3 – Dougherty Ch. 4, 5, and 6
	Topic 3: Classical Assumptions and Gauss Markov Theorem • Multicollinearity • Heteroscedasticity • Autocorrelation • Endogeneity Problem • Readings: – Lecture Notes: Ch. 4 – Dougherty Ch. 7, 12, and 9
	Topic 4: Advanced Topics in Regression Analysis • Instrumental Variable and 2SLS • Discret Choice Models (if time permits) – Lecture Notes: Ch. 5 and Ch.6