

ECON 327-A: INTRODUCTION TO ECONOMETRICS

Spring 2023

Instructor: Jason Ralston	Time: MWF 10:00 AM - 10:50 AM
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Class Structure: With the constraints places on us by COVID-19 and its variants during the Spring 2022 semester, I have tried to make class materials as accessible – and myself as accommodating – as possible. To that end, I will create my own tutorials for using the statistical software and posting them to the Canvas page when needed.

In general, two-thirds of our classes will be devoted to covering theory on Mondays and Wednesdays. Usually we will be covering software instruction on Fridays, though some Fridays will be used for theory instead. If you ever need help with *either* type of topic (theory and software), stop by during office hours or contact me to set up an online meeting that works for you.

If you can think of a resource you would like to see that I have not mentioned specifically, please email me and let me know.

Office Hours: Mondays and Wednesdays from 3:00 PM - 5:00 PM in Maxey 223 or by appointment.

Textbooks: The recommended textbook for this class is Jeffrey Wooldridge, “Introductory Econometrics: A Modern Approach (7th edition)”.

Another resource you should consider reading is Gujarati & Porter, “Basic Econometrics (5th edition)”. While I will not draw from this text as heavily, this book sometimes describes concepts using better examples.

You will not be tested on material in these books that we do not cover in class.

Should you wish to see some additional examples of how to do econometrics with R, I recommend the website/textbook *Econometrics with R* (<https://www.econometrics-with-r.org/>).

Prerequisites: ECON 227 (or MATH 128/247) and ECON 307.

Objectives: This class is designed to teach you the statistical theory behind econometrics as well as give a practical guide for how to use those statistical tools to conduct economic research. This has the potential to be one of the most important classes you will take in the field of economics and the methods discussed in this class should be applicable even outside the realm of economics. In addition to seeing the mathematical mechanics at work, you will gain hands-on experience with the statistical package R and RStudio so that you can complete this course’s research project.

Communication: I will inform the class regularly about upcoming plans and changes to the class website on Canvas. You can find all lecture notes, homework solution, and links to discussion material on the Canvas website.

Tentative Course Outline:

Week	Day	Topic	Reading
1	Jan 18	Introduction to Econometrics	N/A
	Jan 20	Introduction to R	N/A
2	Jan 23	Statistics Review - Random Variables/Parameters	N/A
	Jan 25	Statistics Review - Estimators & Properties	N/A
	Jan 27	Statistics Review - Stats in R	N/A
3	Jan 30	Introduction to SLR	Sections 2-1 & 2-2
	Feb 1	Properties of SLR (Day 1)	Section 2-3
	Feb 3	Properties of SLR (Day 2)	Section 2-4
4	Feb 6	Assumptions of OLS	Section 2-5
	Feb 8	Introduction to Binary Variables/RCTs	Section 2-6
	Feb 10	Simple Linear Regression in R	N/A
5	Feb 13	Introduction to MLR	Sections 3-1 & 3-2
	Feb 15	Expectation of MLR estimators	Section 3-3
	Feb 17	Variance of MLR estimators	
6	Feb 20	NO CLASS - PRESIDENT'S DAY	N/A
	Feb 22	Failure of OLS assumptions	Sections 3-2 & 3-3
	Feb 24	Failiure of OLS assumptions pt. 2	Sections 3-2 & 3-3
7	Feb 27	MLR in R	N/A
	Mar 1	Inference in OLS (Individual tests day 1)	Sections 4-1 & 4-2
	Mar 3	Inference in OLS (Individual tests day 2)	Sections 4-3 & 4-4
8	Mar 6	Inference in R	N/A
	Mar 8	Inference in OLS (Joint tests)	Section 4-5
	Mar 10	Scaling and higher-order terms	Sections 6-1, 6-2, and 6-3

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	Mar 13 - 24	SPRING BREAK - NO CLASS	N/A
9	Mar 27	Prediction and Residual Analysis	Section 6-4
	Mar 29	Qualitative information (dummy variables)	Sections 7-1, 7-2, 7-3
	Mar 31	Interaction Variables	Section 7-4
10	Apr 3	Linear Probability Models	Sections 7-5 & 7-7
	Apr 5	Heteroskedasticity	Sections 8-1, 8-2, 8-4
	Apr 7	Measurement Error and Data Problems	Sections 9-4 & 9-5
11	Apr 10	MLR with problems in R	N/A
	Apr 12	Time Series & Autocorrelation (Day 1)	Sections 10-1, 10-2, 10-3b
	Apr 14	NO CLASS	N/A
12	Apr 17	Time Series (Day 2)	Sections 11-1, 11-2, 11-3
	Apr 19	Time Series in R	N/A
	Apr 21	Panel Data Introduction	Sections 13-1 & 13-3
13	Apr 24	Differences in Differences	N/A
	Apr 26	Instrumental Variables & 2SLS	Sections 15-1, 15-2, 15-3
	Apr 28	Regression Discontinuity	N/A
14	May 1	Advanced Methods: Non-Linear Probability	Section 17-1
	May 3	Advanced Methods: Censored Data	Section 17-2
	May 5	Advanced Methods: Sample Selection	Sections 17-4 & 17-5
15	May 8	FINAL REVIEW	N/A

Grading Policy:

- Homework (30%)
- Midterms (30%)
- Final Exam (20%)
- Final Project (20%)

Grading Scale:

A		B			C			D	F
A	A-	B+	B	B-	C+	C	C-	D	F
100% - 94%	93.9% - 90%	89.9% - 87%	86.9% - 84%	83.9% - 80%	79.9% - 77%	76.9% - 74%	73.9% - 70%	69.9% - 60%	Less than 60%

Once grading is completely finished, grades may be adjusted according to a curve. Do not ask for regrades or grade changes. Unless there is a grading error, grades will remain unchanged.

Homework Assignments: There will typically be weekly homework assignments. The lowest homework score will be dropped for each student.

Homework in this class will be a mixture of theory and computer exercises. This class will make heavy use of R-Studio, a free statistical software package. I will be teaching how to use R-Studio and homework solutions will be provided that use R-Studio. However, if you are more comfortable using a different software package, please do so. Make sure that you are clear about which software package you have chosen if it is not R-Studio.

Late Homework: Late homework can be submitted. However, for each 12 hours that the assignment is late, the grade will drop by 10 percentage points. For example, if an assignment were turned in 10 hours late and it would have received an 85% if had been turned in on time, it would instead receive a 75%.

Exams: A substantial portion of your grade will be based on two midterms and a final. *I do not give makeup exams except in the case of verified, unexpected emergencies.* If such an event occurs, verification will need to be submitted as soon as possible by both the student and the Dean of Students.

Exams will largely consist of free-response questions. Often questions will require you to make an economic or statistical argument, show some property of an estimator, or perform calculations either by hand. Generally there will be no multiple choice questions, as checking steps in your reasoning will be crucial for success.

Final Project: There will be a final empirical project in which you will apply the tools we will study in this class to real world data. With a partner, you will come up with a research question (i.e. how does X affect Y), provide some background information from the economics literature, collect data and estimate a simple regression, and then provide a thoughtful interpretation of your results.

You have several formats that you can pursue for your final project: a paper, a video, or a podcast. There will be no final presentation of the project. However, no matter what format you decide to pursue, the same material should be presented in every project. The material and outline for the project will be covered in class using a rubric.

Questions and Comments: As you progress in this course, you will undoubtedly find yourself with questions or comments about the material we discuss. Whenever you have a question answered in a future class, or have a topic you believe would be well suited for a future class, please submit it using my Google Form (<https://forms.gle/6ZWH63wEnAiiCp2x7>).

Extra Credit: Throughout the semester you *may* be given the opportunity to earn extra credit. The nature of the extra credit and its point value will be discussed on a case-by-case basis.

Important Due Dates:

Midterm March 10th
Final Exam May 15th

Student Responsibilities:**How to Succeed:**

1. Read chapters of the textbook the correspond to the lecture notes.
2. Start homework earlier rather than later.
3. If you are finding the material difficult, please seek help from either your classmates or me. The material in this class builds on itself, so getting lost early can be detrimental to understanding material later on.
4. Feel free to work on assignments together. Not only will it help with your understanding, but you will form bonds with classmates that will be extremely valuable as you continue on at Whitman.
5. When reading about studies in the news, use the topics covered in this course to make sense of their estimates and how believable they are.

Accommodation: If you require an accommodation, please contact me, either in person or through the Academic Resource Center (503) 527-5213. I am here to help in any way I can.

Excused Absence: The Dean of Students may authorize absences from classes in cases of exigency (injury, illness, or family emergencies). In the event that such a verifiable emergency requires you to miss a scheduled exam, I expect you to contact me directly, as soon as possible.

Mental Health: Students (and people in general) struggle with mental health, even without academic considerations. If you have trouble with a course or are anxious about anything in general, please feel free to contact me. I am here to help!

Academic Integrity: Cheating and plagiarizing are **NOT** tolerated in my class. Cheating will result in a failing grade for that assignment and violations will be reported to the Dean of Students. The maximum penalty for academic dishonesty at Whitman College is permanent expulsion.

As stated above, you are encouraged to work together on homework assignments. However, I should be able to tell your work apart from that of another. If any work looks too similar, both assignments will receive a penalty.

Working together on a test is strictly prohibited unless otherwise stated. Evidence of collaboration will result in a zero for that test.