

# **Econ 452 - Econometrics**

University of Massachusetts Amherst

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*Please read every section of this Syllabus fully and carefully before the course starts!*

## **I. Course Outline and Objectives**

This course will introduce you to applied econometrics. We will introduce the main methods and statistical techniques for analysing economic data. Economists and other social scientists use econometrics to help answer cause-and-effect questions (“does loose monetary policy spark economic growth or create inflation?”; “does mandatory health insurance make people healthier?”) or make forecasts (“by how much will the US economy grow next year?”; “how many people do we expect to file for unemployment insurance next month?”).

The main tool of econometrics is regression analysis, which is concerned with uncovering and estimating relationships between different variables in economic data.

In this course you will:

- Learn about regression analysis, emphasizing the intuition behind the methods and their application to real world data.
- Gain an understanding of causal inference. Causal inference aims to infer cause-and-effect relations from the associations that we observe in the data.
- Learn how to use and program code in STATA, a powerful and widely used statistical software for data analysis.
- Gain hands-on experience analyzing data and interpreting the results, through take-home exercises and projects.

## II. Pre-requisites

To fruitfully participate in this course, students should have successfully completed

(1) One of the following: Math 127 or Math 131 or Econ 151 or Econ 152

AND

(2) One of the following: Res-Econ 211 or Res-Econ 212 or Statistics 240 or Statistics 501 or Statistics 515

The first pre-requisite means you have taken a math course that covers the basic mathematical methods used in economics. The second means that you have taken a introductory course covering core ideas in statistics and probability.

## III. Course Organization and Materials

### A. Required Textbook

James H. Stock and Mark W. Watson, *Introduction to Econometrics* (4th edition)

### B. Statistical Software

The STATA statistical software will be used in this course (<http://www.stata.com/>). In classes and lab meetings, there will be a computer with STATA installed available to each of you. Outside of classes, to practice and perform take-home assignments, you can access STATA on your computer free of cost through Windows Virtual Desktop (WVD). To use STATA on your computer using WVD, please follow the instructions at the following link (works both with Windows and Mac machines):

<https://www.umass.edu/it/support/computer-classrooms/access-software-windows-virtual-desktop>

You can also access STATA outside of classes in the computers that UMass makes available to students on campus. Information at the following links:

<https://www.umass.edu/it/support/computer-classrooms/fag>  
<https://www.umass.edu/it/support/accounts/log-it-computer-classrooms>  
<https://www.umass.edu/it/computer-classrooms/itcomputerclassroomlocations>

Please contact the IT support center (<https://www.umass.edu/it/support>) for help accessing STATA outside of classroom using WVD and/or campus computers.

For tips and tutorials on using Stata beyond what you learn in the weekly lab sessions, there are numerous free online resources, such as those available through the Institute for Digital Research and Education at UCLA

(<https://stats.idre.ucla.edu/stata/>). ISSR at UMass Amherst also offers support services for Stata users (<https://www.umass.edu/issr/what-we-do/consultation> ).

C. Moodle

Moodle will be used to upload materials (including lecture videos and notes), make announcements and administer assignments and quizzes.

D. Weekly readings

Reading regularly is key to success in this course. Approximately every week, you will be assigned a reading, and a reading-based quiz that will test your comprehension of the reading (some detail on these quizzes is given in Section V below). The expected calendar of readings is outlined in Section IV below. The best way to check when the next reading is due is to look at the “Quizzes and assignments” section in the Moodle page, and open the description of the next reading-based quiz, which will indicate what is the reading and when it is due.

E. Communications

I will often send you emails and post new materials on Moodle. In order to succeed in this course, you will need to stay updated by checking your UMass email and the Moodle page of the course regularly.

F. Lab Sessions

All students are assigned to weekly lab sessions on Friday (time and place as indicated on SPIRE). Lab sessions are an integral part of this course. You will review the key concepts, do exercises, and practice with the STATA statistical software.

G. Contacting the teaching assistant and the instructor

The best way to reach out to the TA or the instructor is to send an email. The professor’s office hours are on Wednesday 3:00-4:00pm on Zoom. The TA’s office hours will be communicated by your TA. If you can, please send an email before coming to office hours, announcing that you will come and possibly giving an indication of what it is that you want to meet about. While sending a email beforehand is ideal, also just (virtually) walking in is fine.

If you have feedback or concerns, feel free to bring them up with the TA or the instructor – we will do our best to address them.

H. Policy about extensions requests for quizzes and assignments

Requests of extensions for take-home assignments must be directed to your TA (not the professor) *before* the deadline and only for extraordinary (and documented) reasons. *Extensions cannot be requested for reading-based quizzes*-the whole point of these quizzes being to incentivize people to do the reading by the deadline. Of course, it can happen to be unable to do a reading-based quiz for health issues or other unexpected reasons: this is why the two worst-graded quizzes (including any missed ones) are not counted.

## IV. The Plan

Following is a *tentative* schedule for the course. Take it as a broad indication: it is subject to change based on how fast or slow we will go as a group. Any change will be announced in advance as much as possible. Please refer to Moodle for an updated schedule and for all course deadlines.

Week	Reading	Tuesday meeting	Thursday meeting
1	S&W Chapters 1-2 (due Thursday)	Sep 6 Introduction: Economic Questions and Data	Sep 8 Review of Probability
2	S&W Chapter 3 (due Thursday)	Sep 13 Review of Probability	Sep 15 Review of Statistics
3	S&W Chapter 4 (due Thursday)	Sep 20 Review of Statistics	Sep 22 Linear regression 1: one regressor
4	S&W Chapter 5 (due Thursday)	Sep 27 Linear regression 1: one regressor	Sep 29 Linear regression 1: one regressor
5	S&W Chapter 6 (due Thursday)	Oct 4 Linear regression 1: one regressor	Oct 6 Linear regression 2: multiple regressors
6	S&W Chapter 7 (due Thursday)	Oct 11 Linear regression 2: multiple regressors	Oct 13 Linear regression 2: multiple regressors
7	No new reading (Prepare for mid-term)	Oct 18 Linear regression 2: multiple regressors	Oct 20 Review Session
8	S&W Chapter 8 (due Thursday)	Oct 25 Mid-term Exam	Oct 27 Nonlinear regression functions
9	S&W Chapter 9 (due Thursday)	Nov 1 Nonlinear regression functions	Nov 3 Assessing regression-based scientific studies
10	S&W Chapter 10 (due Tuesday)	Nov 8 Panel Data	Nov 10 Panel Data
11	S&W Chapter 12 (due Tuesday)	Nov 15 Instrumental Variables	Nov 17 Instrumental Variables
12	-	Nov 22 No class (Friday schedule)	Nov 24 No class (Thanksgivings)
13	S&W Ch.13.1-13.3 + Moodle material (due Tuesday)	Nov 29 Randomized Control Trials	Dec 1 Randomized Control Trials
14	S&W Ch.13.4-13.5 + Moodle material (due Tuesday)	Dec 6 Parallel Worlds: Difference-in-Differences	Dec 8 Parallel Worlds: Difference-in-Differences

S&W = "Introduction to Econometrics" (4<sup>th</sup> Edition) by James H. Stock and Mark W. Watson

Moodle Material = additional required materials that will be freely available on Moodle

## V. Requirements and Grading

The course requirements consist of:

- 12 weekly reading-based quizzes;
- 4 take-home (“post-lecture”) assignments;
- a mid-term exam and a final exam.

*It is your responsibility to be aware of the quizzes and assignments posted on Moodle and their deadlines, by checking the Moodle page of the course regularly.*

Weekly reading-based quizzes are to test your comprehension of the readings I will assign. They have a small weight on your final grade, you can submit unlimited attempts (only the last attempt is graded) and see your score after each attempt. Post-lecture assignments, instead, cover topics we have already discussed in class. They carry a more significant weight; you can take unlimited attempts and only the last one is graded, but you cannot see your score after each attempt. We will also do a mid-term and final exam. Below you can find more details on each of these items.

### A. Weekly reading-based quizzes

Whenever you are assigned a reading, you will also have a quiz on the reading, to be completed on Moodle. These quizzes are due by the night before the class: they are designed so that you can do them after doing the reading, but you don’t need to have attended the lecture yet.

There will be 12 reading-based quizzes in all- one each week, except the week of the mid-term exam. The two in which you do worse will not be counted. You can make unlimited attempts and will be able to see your score after each attempt. Only *the last* attempt will be graded. Reading-based quizzes will account for **15% of your grade**.

Note: extensions *cannot* be granted for reading-based quizzes (the whole point is to motivate students to read the material before class). If you skip one or two pre-lecture quizzes, they will just count as the 2 worst-graded ones, so they will not be counted towards your final grade.

### B. Post-lecture assignments

4 “post-lecture” assignments will be distributed through Moodle. I will make available the assignments on Moodle at least 10 days before they are due. You can make unlimited attempts but (unlike pre-lecture quizzes) will not be able to see your score after each attempt. Only *the last* attempt will be graded.

Take-home assignments will account for **35% of your grade**.

Note: Extension requests for take-home assignments must be directed to your TA (not the professor) *before* the deadline and only for extraordinary (documented) reasons.

### C. Mid-term exam

The mid-term exam will be done in class, during class hours. The expected date is Oct 25, but it might change depending on our pace as a class. The midterm exam will account for **25% of your grade**.

#### *D. Final exam*

The final exam will take place in December (date TBD). It will be similar in format to the mid-term exam. The final exam will account for **25% of your grade**.

### **VI. Accommodations for disability**

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you need accommodation for a documented disability, register with Disability Services to have an accommodation letter sent to your faculty. It is your responsibility to initiate these services and to communicate with faculty ahead of time to manage accommodations in a timely manner. For more information, consult the Disability Services website at <http://www.umass.edu/disability/>

### **VII. Academic honesty**

Academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. The instructor may employ appropriate software (such as Turnitin or others) to check for possible plagiarism. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. The instructor will take reasonable steps to address academic misconduct.

Since students are expected to be familiar with academic honesty policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent.

For more information about what constitutes academic dishonesty, please see the Dean of Students' website:

[http://umass.edu/dean\\_students/codeofconduct/acadhonesty/](http://umass.edu/dean_students/codeofconduct/acadhonesty/)