

ECON 3720: Introduction to Econometrics
Spring Term 2025
University of Virginia

Professor: Jack Fisher (jwfisher@virginia.edu), Elson 164C

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Course Description: Econometrics uses statistical methods to analyze economic data and answer causal questions. This course provides a comprehensive introduction to the theory and practice of econometrics, equipping students with the tools needed to interpret data and draw meaningful conclusions.

The course begins by establishing the theoretical foundations of econometrics, focusing on key estimation methods such as ordinary least squares (OLS). Students will explore the underlying principles of statistical inference and how they are applied to model economic relationships. Alongside theory, the course emphasizes practical skills, including addressing common econometric challenges and applying techniques to real-world data.

Students will gain proficiency in statistical programming, data handling, and econometric models through lectures, examples, and hands-on data analysis. By the end of the course, they will have the expertise to design and conduct research projects that answer causal economic questions, supported by a strong grounding in probability, statistics, and econometric methodology.

Prerequisites: Students should be comfortable with basic probability, statistics, and multivariate calculus concepts. The course begins with a brief refresher.

Course Structure: Lectures will cover the course material. Discussion classes will discuss problem-set solutions and the course material. Students will also have opportunities to ask questions about the topics from lectures. Problem-set due dates will be announced as the course progresses and must be submitted online via Canvas. Course communications will occur through Canvas and over email. On rare occasions, lectures may be held on Zoom. In this case, an invite will be sent out before the scheduled lecture time.

Office Hours: I will hold office hours in person on Wednesdays between 3 and 5 p.m. in my office (Elson 164C). On rare occasions, these may be held on Zoom. Teaching Assistants will hold additional office hours.

Text and Readings: The lecture slides will provide much of the information required for the course. However, the following texts will help provide context and additional details.

Required:

- Wooldridge, J. *Introductory Econometrics: A Modern Approach*, 5th Edition, South-Western College Publishing, 2012.

Recommended:

- Angrist, J. and Pischke, J.S. *Mastering Metrics: The Path from Cause to Effect*, Princeton University Press, 2014.

Additional readings and resources will be posted on Canvas.

Software:

- Stata is freely accessible on UVA's Remote Apps, though a limited number of licenses can be used at once: https://virginia.service-now.com/its?id=itsweb_kb_article&sys_id=f9dc08eddb1d1380f032f1f51d96192d
- Stata/BE. I recommend purchasing a 6-month license for \$48: <https://www.stata.com/order/new/edu/gradplans/student-pricing/>
- Julia, R, and Python can also be used; however, the course will not provide support in these languages.

Grading:

- Problem Sets (25%)
- Midterm Exams 1 and 2 (25% each)
- Final Exam (25%)

Problem Sets: 25 percentage points of your grade is banked. You can preserve this credit by turning in problem sets on time. You do not have to get everything right or complete everything to retain this credit. However, in the grader's judgment, you must make a reasonable effort on all questions. If you do not make a reasonable effort on half of the questions, you will lose ten percentage points of your banked credit. If you do not make a reasonable effort on all—but more than half—of the questions, you will lose five percentage points of your banked credit.

You can “skip” one problem set (e.g., because you are traveling or ill), but if you fail to turn in a problem set or turn it in late again, you will lose 15 percentage points of your banked credit. You are welcome to work in groups. However, you cannot submit a problem set with more than three people's names on it. This does not mean you cannot work in groups of more than three people.

The problem sets follow the course material, so the due dates for problem sets will be announced as we progress.

Exams: You will have one hour and fifteen minutes to complete midterm exams and three hours for the final exam. Calculators and a small (8.5" x 11") cheat sheet are allowed in all exams. You may write in pen or pencil, but your exam will not be considered for regrading if you use a pencil.

Midterm Exams: Midterm exams will be held during lecture hours. The two midterm exams will *tentatively* be on February 13th and April 17th. Like the problem sets, the midterms follow the course material so the final midterm dates will be announced in due course. Individual arrangements are not made for taking midterms at alternative times. For students who cannot take a midterm at the allotted time due to varsity athletics or illness (both requiring evidence), zero weight will be allocated to that midterm exam. The remaining midterm exam will be reweighted to account for 50 percentage points of the overall grade. If a student cannot make any midterm exams, the final exam will be reweighted to account for 75 percentage points of the overall grade.

Final Exam: The final exam date, which depends on your section, can be found at <https://registrar.virginia.edu/exam-schedules>. There is only ONE final examination for Professor Fisher's EC3720 class. If you are enrolled in a course that is also assigned this exam time, then you should reschedule that exam or enroll in another EC3720 class immediately. There is no late option or make-up for the final exam.

Grading Questions: Exams will be graded by the teaching assistant (TA). Grades assigned by the TA are not subject to appeal unless the TA makes an error. Your work is expected to be neat and legible. If the TA finds your work too sloppy and/or illegible, you may not receive credit for a given response. Before attempting an appeal, please check your answers against the correct solutions as provided by your TA in discussion sessions. Any re-grade requests for the exams must be written, and substantive reasons must be given for why specific questions were graded improperly. The full exam will be re-graded. Your final score may go up, go down, or remain unchanged due to the re-grade. The re-grade outcome is then final. All of this must be completed within 3 weeks of the test date.

Add, Drop, and Withdrawal: The last day to drop the class is January 28th. The last day to withdraw is March 17th. A grade of W is given if a student withdraws between January 28th and March 17th. Withdrawal before January 28th will result in the course being removed from your transcript.

Honor: Because of the Honor System, I assume that students in EC3720 are truthful with teaching assistants and me and do not cheat on exams. In the unlikely event that you observe an incidence of cheating, I assume you will contact an Honor Advisor. Students deemed by Professor Fisher to have violated the University's Honor System are not eligible for a final grade. All exams must be completed independently. We have many tools to flag and identify when cheating has occurred.

Flexibility and Contingency: I encourage you to have a plan for communicating with me in case you become ill. If I become ill, I will contact a colleague and/or my department chair to explain how our course will proceed. Please pay close attention to email and Slack communications throughout this semester.

An Inclusive Environment: I recognize and value the many perspectives my students bring to the classroom. Many factors—social identities, visible and invisible disabilities, family circumstances, physical location, mental health, access to the internet, *etc.*—influence every individual's experiences in my courses this and every semester. I am committed to building an environment to support your learning, one in which you will be supported and rewarded for going out on a limb to communicate and defend your ideas. Students of all races and ethnicities are welcomed and valued in this class. I acknowledge that racism and white supremacy are baked into both the history of UVA as an institution and the history of higher education. I believe that my pedagogical philosophies and practices can either reinforce inequities or work to eliminate them. I am committed and actively working to be a better, more careful listener, continuing to learn about the ways systemic injustices disadvantage my Black students and colleagues and other students and colleagues of color in and out of the classroom, and advocating for and implementing anti-racist educational practices. I will hold myself accountable, encourage you to help me do so, and invite you to join me in this work.

Students of all immigration statuses are welcomed and valued in this classroom, including undocumented students, students from mixed-status families, and students with Temporary Protected Status. As an educator and immigrant, I aim to create a learning environment that respects and affirms the diversity of students' experiences and perspectives. If your status impacts your success in the course, please come see me to discuss things I can do to accommodate you (assignments, attendance, *etc.*). I pledge to keep your status confidential unless required by a judicial warrant.

Mental Health and Well-being: If you are feeling overwhelmed, stressed, or isolated, many individuals are here to help. The Student Health and Wellness Center offers Counseling and Psychological Services (CAPS) for its students; call 434-243-5150 to speak with an on-call counselor and/or schedule an appointment. If you prefer to speak anonymously, you can call Madison House's HELP Line at any hour of any day: 434-295-TALK. Alternatively, you can call or text the Disaster Distress Helpline (1-800-985-5990, or text TalkWithUs to 66746) to connect with a trained crisis counselor; this is toll-free, multilingual, and confidential, available to all residents in the US and its territories.

Our Contract: This syllabus is important if you remain in the course. Continued enrollment in the course indicates agreement with all the stipulations laid out in this document. All future discussions between you and me assume your agreement with this syllabus.

Legal Notice: Students are prohibited from selling or sharing materials from this course with any person or commercial firm (or being paid to take notes) without the express written permission of Professor Fisher.

Tentative Course Outline:

1. Review of Statistical Tools
 - Probability
 - Expectations and Moments
 - Sampling Distributions

2. Regression
 - The Conditional Expectation Function
 - Bivariate Regression
 - Multivariate Regression
 - Statistical Inference
 - Measurement Error
 - Functional Forms
 - Generalized Linear Models

3. Instrumental Variables (IV)
 - Causality
 - Two Stage Least Squares
 - Relevance
 - Exogeneity

4. Other methods of causal inference
 - Difference-in-Differences
 - Regression Discontinuity Designs