Econ 9472: Econometric Theory I

Fall 2025

Instructor	Zack (J. Isaac) Miller	millerjisaac@missouri.edu
Course	MW 2:00-3:15PM	Locust Street Building E204A
Office Hours	MW 3:30-4:00PM	Locust Street Building E220
Website	Canvas (https://umsystem.instructure.com/)	

Welcome to Mizzou and to the first semester of our Economics PhD program!

Course Objectives: The primary objective is to introduce the student to econometric analysis of data at an advanced level. The emphasis of the course is on theoretical analysis of cross-sectional methods, particularly least squares. Although all econometric tools are designed with an eye toward empirical application, a solid theoretical understanding of these tools is critical to sound application of them. These tools are applied in nearly all fields of research in economics and econometrics, as well as in business, finance, political and other social sciences, and in some natural sciences.

After you finish this course, you will be able to …

- … construct and estimate models of linear relationships between multiple sequences of random variables.
- … interpret your estimates in the context of a conditional expectations function model, a linear projection model, and/or a causal model.
- … analyze the statistical properties of ordinary least squares and related estimators.
- … apply asymptotic theory to assess consistency and asymptotic normality of estimators.
- … construct, execute, and interpret statistical hypothesis tests of linear restrictions imposed on the parameters of linear models.

Prerequisite: PhD standing in Economics or instructor's consent.

Textbook: Hansen (2017). *Econometrics*. Bruce Hansen's lecture notes. Any version is an excellent reference, but lectures follow the ***January 2017*** version available on Canvas.

Topics Covered:

I. Mathematical and Statistical Tools

- Conditional Expectation and Projection (Chapter 2)
- The Algebra of Least Squares (Chapter 3)

II. Econometrics 101

- Least Squares (OLS) (Chapter 4)
- Normal Regression and Maximum Likelihood (ML) (Chapter 5)
- Asymptotic Theory (Chapters 6 & 7)
- Hypothesis Testing (Chapter 9)

Grade Composition:

HW Assignments ..... *20% of the course grade*

I expect you to complete HW assignments ***on your own*** with only *limited* collaboration. Please also refer to the statement on the use of artificial intelligence below.

Some homework assignments later in the semester will require programming using a statistical package. I will provide sample programs and *limited* classroom instruction using R, which is open source and free. You may use an alternative software package at your own risk.

Midterm Exam #1 ***(September 24)*** ..... *20% of the course grade*

Midterm Exam #2 ***(October 29)*** ..... *20% of the course grade*

Cumulative Final Exam ***(December 17)*** ..... *40% of the course grade*

I plan to hold the exam at ***12:30PM-2:30PM Wednesday, December 17***. It will be a traditional "closed-book, closed notes" exam. We have some flexibility because our classroom is not centrally scheduled, so let me know as soon as possible if you have another exam scheduled on that day.

Statement on Use of Artificial Intelligence

Learning to use AI responsibly and ethically is an important skill. On the other hand, learning technical skills and applying creativity are integral parts of a doctoral education in economics, so the use of generative AI in this course is limited as explained below.

The use of generative AI tools is ***permitted*** in this course for the following activities:

- Brainstorming and refining your ideas,
- Intermediate calculations in solving problems,
- Checking grammar and polishing style. (Do not use for extensive rewriting!)

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

- Solving homework problems from start to finish,
- Writing entire sentences or paragraphs.

Under no circumstances may homework or practice test problems be ***uploaded*** partially or completely in any form to an AI. These are not your intellectual property to be shared. Except as provided above, ***all other uses are prohibited*** without the prior and explicit consent of the instructor.

All uses of AI ***must be disclosed***, and you may not submit any work generated by an AI program as your own. Failure to comply is a violation of academic integrity policies and will be subject to the sanctions below. Your disclosure statement should be in a form similar to the following:

"AI Disclosure Statement: During the preparation of this work, I used [e.g., ChatGPT] to [e.g., research XYZ laws]. After using this tool, I reviewed and edited the content as needed and I take full responsibility for the content of this paper."

You should assume AI-generated output is wrong unless you cross-check it with reliable sources. You are responsible for fact-checking all AI output and you bear final responsible for any errors or omissions.

Sanctions for violation of these AI policies may include receiving a grade of F or 0 on the work submitted, as well as referral to the Academic Integrity Office.

These guidelines apply to all work, written or otherwise, in this course.

Syllabus Information from the Office of the Provost

The information below appears in Canvas under "Supports & Policies" > "MU Policies and Expectations," so that all students in all courses have access to this.

The policies included here have been approved by Faculty Council Academic Affairs and apply to all courses regardless of what statements are in course syllabi; however, there may be additional policies specific to a course or to the academic unit or college that is offering the course. When in doubt about policies and expectations, contact your instructor.

Click here for detailed information on each of these important topics:

- Academic Integrity
- Academic Inquiry, Course Discussion and Privacy
- FERPA
- Intellectual Pluralism
- Mental Health
- Netiquette
- Religious Holidays & Accommodations
- Nondiscrimination Policy (Prohibited Discrimination)
- Students with Disabilities
- Decreasing the Risk of COVID-19 in Classrooms and Labs
- Statement for Face-to-face Courses