

Econ 9474: Topics in Advanced Econometrics I

Fall 2024

Instructor	Zack (J. Isaac) Miller	millerjisaac@missouri.edu
Course	MW 3:30-4:45PM	Locust Street Building E204A
Office Hours	W 10:00-11:00AM	Locust Street Building E220
Website	Canvas (https://umsystem.instructure.com/)	

Congratulations! You passed your econometrics qualifier!

Course Objectives: The primary objective is to familiarize the student with statistical time series tools commonly employed in econometric analysis and essential both for much applied and empirical research in macroeconomics, finance, and other fields and for understanding additional statistical time series tools.

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

- ... understand the concepts of stationarity and unit roots and the implications of each on estimation and inference.
- ... construct, estimate, analyze, and forecast stationary and nonstationary models in the class of autoregressive moving average (ARMA) models.
- ... construct, estimate, and analyze reduced-form vector autoregressions (VARs) and recursively identified structural vector autoregressions (SVARs).
- ... test for unit roots and cointegration of unit root processes.
- ... construct state space models and apply the Kalman and related filters to estimate them.
- ... test and estimate models based on time series with conditional heteroskedasticity.

Prerequisite: Econ 9473 or instructor's consent.

Textbooks: Miller, J.I. (2023). *A Course in Econometric Analysis of Stationary and Nonstationary Time Series* (**required**, free) Hamilton, J.D. (1994). *Time Series Analysis* (recommended). I have been making the most recent version of my lecture notes accessible to students of this class for free since about 2010 and in “textbook” form since 2020. Lectures will follow these notes closely, but I strongly encourage you to **take your own notes** to learn the material better.

Topics Covered:

- I. Stationary Series
 1. Introduction to Time Series
 2. Stationary Processes in the Time Domain
 3. Stationary Processes in the Frequency Domain
 4. Some Limit Theory for Stationary Processes
 5. Single-Equation Models with Stationary Processes
 6. Simultaneous-Equation Models with Stationary Processes
- II. Integrated Series
 7. Integrated & Cointegrated Series
 8. Single-Equation Models with Integrated Processes
 9. Simultaneous-Equation Models with Integrated Processes
- III. Topics in Time Series
 10. State Space Models (SSMs) and the Kalman Filter
 11. Autoregressive Conditional Heteroskedasticity (ARCH)

Grade Composition:

HW Assignments 50% of the course grade

I expect you to complete HW assignments *on your own* with only *limited* collaboration.

Homework assignments 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.

Research-Referee-Respond Project 50% of the course grade

Assigned components will be due throughout the semester. Submissions will be through Canvas and presentations will be after Thanksgiving.

Learning technical skills and applying creativity are integral parts of a doctoral education in economics. Because I want to evaluate *your* technical skills and creativity, use of artificial intelligence such as ChatGPT is not allowed for the completion of any assignments in this course. You are welcome to raise questions or concerns with me about this policy.

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:

- Decreasing the Risk of COVID-19 in Classrooms and Labs (August 9, 2022)
- Academic Integrity
- Academic Inquiry, Course Discussion and Privacy
- FERPA
- Intellectual Pluralism
- Mental Health
- Netiquette
- Religious Holidays & Accommodations
- Nondiscrimination Policy (Prohibited Discrimination)
- Students with Disabilities
- Statement for Face-to-face Courses