

Econ 9474: Topics in Advanced Econometrics I

Fall 2022

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

Congratulations! You passed your econometrics qualifier! I rely heavily on Canvas to facilitate assignments and grading, but all lectures are planned to be face-to-face. Please note the location in the Locust Street Building, which is not reflected in MyZou.

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. (2021). *Economics 9474 Lecture Notes* (required, free) Hamilton, J.D. (1994). *Time Series Analysis* (recommended, available in the campus store). This course was originally designed around three sources: Hamilton (1994), a classic but somewhat inaccessible textbook by Brockwell and Davis (1991), and Yoosoon Chang's lecture notes circa 2002. Hamilton (1994) is an excellent and enduring reference volume. However, I have been making the most recent version of my lecture notes accessible to students of this class for free since about 2010. Lecture topics will follow these notes closely. Having said that, I strongly encourage you to *take your own notes*, because studies have shown that students learn best by doing so.

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)
 12. Aggregation and Mixed Sampling Frequencies (if time allows)

Grade Composition:

HW Assignments 50% of the course grade

Homework assignments will require programming using a statistical package. I expect you to complete HW assignments *on your own* with only *limited* collaboration.

I will provide documentation, sample programs, and *limited* classroom instruction for GAUSS. Heavily discounted options for students are available from [Aptech](#).

You may use an alternative software package at your own risk. Some past students successfully completed all assignments using R or MATLAB.

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

Component assignments will be due throughout the semester. Submissions will be through Canvas and presentations will be after Thanksgiving by Zoom.

Technology Requirements:

You will need a desktop or laptop computer to run the necessary statistical software.

It is possible – albeit very unlikely – that we will need to switch lectures to [Zoom](#) due to COVID-19. In that case, remote lectures would be given synchronously with our usual class time, and you would need a webcam and microphone.

I do not plan to record face-to-face lectures. If you need to miss class for a brief period, please get the notes from a classmate.

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 (June 19, 2021)
- Academic Integrity
- Academic Inquiry, Course Discussion and Privacy
- FERPA
- Intellectual Pluralism
- Mental Health
- Netiquette
- Religious Holidays & Accommodations
- Nondiscrimination Policy (Prohibited Discrimination)
- Students with Disabilities