Economics 8838: Seminar – Econometric Theory 2
Spring 2024
MW 11:00am – 12:15pm
Economics – Room 5

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Office Hours: M 1:30 – 3:00pm

Course Description

This is a graduate-level course in time series analysis/econometrics. We will start the course by covering standard topics in modeling and estimation for univariate stationary stochastic processes. We will proceed to the analysis of time series data in the spectral/frequency domain, emphasizing the importance of estimating the long-run variance of a time series, which is crucial to developing standard errors for regressions with time series data. The course will also cover topics in multivariate time series analysis. In particular, we will discuss modeling and estimating dynamic systems, including the vector autoregressive model and state space approaches, with applications to finance and macroeconomics.

Prerequisites

ECON 7828 – Graduate Econometrics (or equivalent)

Course Materials

The required textbook is *Time Series Analysis*, by James D. Hamilton. An optional supplemental textbook is *Time Series: Theory and Methods*, by Peter J. Brockwell and Richard A. Davis. This is an excellent supplement that will be useful for certain parts of the course. In my lecture notes, I will sometimes refer to this text for additional details. Lecture notes and problem sets will be handed out in class. I will add detail to the lecture notes during lecture. Problem sets and exam questions will be based upon both lectures given in class and required readings.

Grades

Final Exam (cumulative)	TBD	60%
Problem Sets	Periodic (about four)	40%

Problem Sets

Periodic problem sets (three or four total) will be based on the textbook and material given in class. Students may work together on problem sets but problem sets must be completed individually.

Tentative Course Outline

I. Introduction to Time Series Analysis
- -Stochastic Processes
- -Stationarity and Dependence

-Autocovariance and Autocorrelation

Readings: 3.1

II. The ARMA Model

- Lag Polynomials
- Autocovariance and Autocorrelation Functions
- Stationarity and Invertibility
- Estimation
- Model Selection

Readings: 2, 3.2-3.5, 3.7, 4.7, 5.1-5.5, 5.8

III. The Frequency Domain

- Spectral Density Function
- Periodogram and Estimation of Spectral Density Function
- Filtering
- Long-Run Variance
- Estimation of Long-Run Variance and Autocorrelation-Robust Standard Errors

Readings: 3.6, 6, 7.2, 10.5

IV. Vector Autoregressive Models

- Structural vs Reduced-Form VARs
- (Partial) Identification of Structural VARs
- Estimation
- Causality
- Impulse Response Functions

Readings: 10.1, 11.1-11.2, 11.4, 11.6-11.7

V. State Space Models

- State Space Representation
- Kalman Filter
- Applications

Readings: 13

University Policies

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website. ***Please submit your accommodation letter as soon as possible to ensure we have enough time to set up accommodations.***

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Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on classroom behavior and the Student Code of Conduct.

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

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Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources. Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please let me know *within the first two weeks of the course* if you have any of these conflicts.
See the campus policy regarding religious observances for full details.