Economics 241B - Econometrics

This course will cover statistical models for the analysis of economic time series data, with applications in macroeconomics and finance. It is intended both for students specializing in econometric theory and for students interested in applying time series methods to economic data. Economics 240A-B (or equivalent) is prerequisite. Economics 241A is not required for Economics 241B this semester, but it is recommended.

The class will meet Monday and Wednesday 4-5:30 in 220 Wheeler. Grading will be based on performance on the (approximately biweekly) problem sets and on two written exams. The first half of the semester will primarily be devoted to analysis of stationary time series data, while the second half will address nonstationarity and nonlinearity/nonnormality/heteroskedasticity in time series.

The principal text for the class is:


Other (optional) useful references are:


More advanced treatments of some of the topics covered can be found in:

REFERENCE LIST FOR 241B

1. **Discrete Time Stochastic Processes**: stationarity; stochastic difference equations; Wold decomposition theorem; ARMA, ARMAX, and state-space models; linear projections and forecasting.
   - Hamilton, chapters 1-4.
   - Harvey, chapters 1-2.
   - Granger and Newbold, chapter 1 and sections 4.1-4.4.

2. **Parameter Estimation and Hypothesis Testing**: fitting ARMA models using nonlinear least squares; maximum likelihood estimation via the Kalman filter; GMM estimation; asymptotic inference.
   - Hamilton, chapters 5, 7, 8, 13, and 14.
   - Harvey, chapters 4-6.
   - Granger and Newbold, chapters 3.

3. **Frequency Domain Analysis**: spectra; filters; transforms; nonparametric estimation.
   - Harvey, chapter 3 and section 6.4.
   - Granger and Newbold, chapter 2.
   - Sargent, sections 11.4-11.12.

4. **Vector Processes**: vector ARMA processes; Granger-Sims causality; simultaneous equations.
   - Hamilton, chapters 10-11.
   - Harvey, sections 2.7, 3.7, 5.7 and 6.7.
   - Granger and Newbold, chapter 7.

5. **Univariate Nonstationary Time Series**: trend-stationarity; unit roots; functional limit theory; testing for unit roots; testing for stationarity; inference on large autoregressive roots.
   - Hamilton, chapters 15-17.

6. **Multivariate Nonstationary Time Series**: spurious regressions; cointegration; estimation and inference; testing for cointegration.

7. **Structural Breaks, Conditional Heteroskedasticity and Nonlinear Models**.
   - Hamilton, chapters 21-22.