Economics 408 Time Series Econometrics

This is an introduction to modeling time series data. The prerequisites are mathematical economics (or math through multivariable calculus) and econometrics or mathematical statistics.

Texts

David F. Hendry, *Dynamic Econometrics* (HB 141.H458 1995, on reserve)

Other readings are available from the Blackboard site:
Moody, *Basic Econometrics with Stata* (BES)

Introduction and Review

Trigonometry (Hamilton 704-711)

Complex numbers
Circular functions
DeMoivre's Theorem

Difference Equations (Hamilton ch. 1)

Dynamic multipliers (P&R 413-431)
Eigenvalues (Johnston, J. "The Eigenvalue Problem")
Stability conditions: roots inside the unit circle

Lag Operators (Hamilton ch. 2)

Lag polynomials
Stability conditions: roots outside the unit circle

Stationary Time Series Models

Univariat Time Series Models and ARMA's
(P&R 463-601; Hamilton ch. 3, 4; J&D 204–215)

Stationary ARMA processes
White noise
Covariance stationarity
MA(q) processes
AR(p) processes

Digression: nonstationary processes and ARIMA

Box-Jenkins forecasting philosophy (M, 542-549; J&D 228-234)

a. Identification
b. Estimation
c. Forecasting

Multi-Equation models: VAR's
(P&R 399-407, 431-435; M, 578-80, 592-7; Hamilton ch. 11; J&D 287-301)

VAR's and reduced form equations
Matrix notation
Stability conditions
Impulse response functions
Hypothesis tests
Granger causality tests (P&R 216-7; M, 393-4)
Assignment: VAR (crime and punishment)

Models of Nonstationary Time Series

Unit Roots (Hamilton ch. 15, 17)

Trend Stationary vs Difference Stationary Models (M, 258-264)
Persistence of shocks
Dickey-Fuller tests (P&R 507-513; M 582-588; J&D 215-228; BES Ch. 15, 16)

Unit root tests and structural breaks

Is Crime a Random Walk?

Multivariate Time Series Models: Cointegration (Hamilton ch. 19)

Cointegration and long term equilibria
Tests for cointegration (P&R 513-516; M, 588-600; J&D 301-305)
Estimating the cointegration vector (dynamic ordinary least squares)

Panel Data (BES Ch. 17)
Fixed effects model
Panel unit root tests
Panel cointegration tests
Is Crime a Random
Walk?

Modeling Time Series Data: David Hendry and the British School
(Hendry, Dynamic Econometrics)

Levels of knowledge (ch 1)
Econometric Concepts (ch 2)
Nonsense regressions and spurious detrending (ch 4)
Exogeneity (ch 5)
Typology of linear dynamic models (ch 7)
Dynamic systems (ch 8)
Theory of reduction (ch 9)
Simultaneous equations (ch 11)
Encompassing (ch 14)
Modeling issues (ch 15)
Example: demand for money in the U.K.(ch 16)

Hendry and Ericsson, "An econometric analysis of U.K. money demand in monetary trends in the
United States and the United Kingdom by Milton Friedman and Anna J. Schwartz."
Granger, C.W.J. "Where are the Controversies in Econometric Methodology?"
"Professor Hendry's Econometric Methodology."
Review and integration with mainstream econometrics: Johnston & Dinardo, 244-265.