Time Series Econometrics with Applications in Macro and Finance Schedule (updated August 29th, 2012).

<u>Text Book</u>: Time Series Analysis, James D. Hamilton (1994).

<u>Supplementary reading</u>:

Robert F. Engle (1982). Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation, *Econometrica*, 50, 987–1007.

Tim Bollerslev (1986). Generalized Autoregressive Conditional Heteroskedasticity, *Journal of Econometrics*, 31, 307–327.

Michael P. Murray (1994). A Drunk and Her Dog: An Illustration of Cointegration and Error Correction. *The American Statistician*, 48, 37–39.

<u>Assumed knowledge</u>:

- Distribution functions for discrete and continuous processes
- Hypothesis testing
- Joint, conditional and marginal distribution functions
- Expectation and conditional expectation
- Variance and conditional variance
- Covariance and correlation
- Matrix algebra
- OLS estimation

Date	Topics	Readings
Week 36 Lecture 1	• Definition of time series • Dynamic multipliers • Lag operators and difference equations	• Chapters 1-2
Week 36 Lecture 2	• Definition of Stationarity • Definition of Ergocity • Autocorrelation • White noise process • ARMA processes	• Chapters 3.1-3.2
Week 37 Exercise 1	• Install R and RStudio • Process simulation, autocorrelations, etc in R	
Week 37 Lecture 3	• ARMA processes (continuation) • Forecasting	• Chapters 3.3-3.7, 4
Week 38 Lecture 4	• Forecasting an AR process • Forecasting a MA process • Forecasting an ARMA process	• Chapter 4
Week 38 Exercise 2	• Simulating, estimating and forecasting ARMA processes in R	
Week 39 Lecture 5	• Maximum likelihood estimation for a Gaussian AR(1) • Maximum likelihood estimation for a Gaussian AR(p) • Maximum likelihood estimation for a Gaussian MA(1) • Maximum likelihood estimation for a Gaussian ARMA(p,q)	• Chapter 5

Date	Topics	Readings
Week 39 Lecture 6	• Heteroskedasticity • ARCH	• Chapter 21
Week 40 Exercise 3	• Maximum likelihood exercises • ARCH processes	
Week 40 Lecture 7	• GARCH models	• Other book or an article
Week 41 Lecture 8	• GARCH models • Stochastic volatility models (?)	• Other book or an article
Week 41 Exercise 4	• Volatility, GARCH, Stochastic volatility	
(Week 42)	Potato Break	
Week 43 Lecture 9	• Vectorautoregressive (VAR)	• Chapter 11
Week 43 Exercise 5	• VAR	
Week 44 Lecture 10	• Nonstationary time series • Processes with deterministic trend	• Chapter 15 16
Week 44 Lecture 11	• Nonstationary time series • Test for unit roots	• Chapter 16 - 17
Week 45 Exercise 6	• Nonstationary time series	
Week 45 Lecture 12	• Co-integrated processes	• Chapter 19

Date	Topics	Readings
Week 46 Lecture 13	• Co-integrated processes	• Chapter 19
Week 46 Exercise 7	• Co-integrated processes • Test for cointegration	
Week 47 Seminar	• Paul Sharp will give a seminar on applied cointegration.	
Week 47 Lecture 15	• Questions	
(Week 49)	**Multiple choice exam** • Whole syllabus • 40% of the final grade	Terminalrum 8-9 • Friday, 7th of December at 10 pm • 2 hours
	Christmas Holidays	
January	**Take home exam** • The whole syllabus • 60% of the final grade	One week