



STAT 804

Time Series Analysis

Spring 2008
Day Course

Students requiring accommodations as at 91.1 729 1.8 2.22 ref9

Textbook:

Time Series Analysis and Its Applications with R Examples, 2nd ed. by: Shumway and Stoffer, Publisher Springer

Prerequisites:

STAT 450 or equivalent or permission of the instructor.

Calendar Description:

An introduction to time series models and their analysis. Both time-domain and frequency-domain techniques will be studied.

Course Outline:

This course is intended to survey both time-domain and frequency domain analysis of time series. I expect you all to be familiar with the basics of the multivariate normal distribution and complex arithmetic. I will develop Fourier methods briefly where necessary.

1. Stationary Processes: definitions, mean, auto covariance, autocorrelation.
2. Linear Processes: white noise, moving averages, auto regressions, ARMA processes, conditions for stationarity, identifiability, invertibility.
3. Model identification: properties of autocorrelation and partial auto correlation functions.
4. Integration: ARIMA processes, differencing, random walks.
5. Seasonal effects.
6. Estimation: maximum likelihood, conditional likelihood and approximations, backcasting.
7. Model diagnostics: residual plots, residual autocorrelation, portmanteau tests.
8. Forecasting: prediction intervals, forecast standard error.
9. Spectral analysis: Fourier expansions, Fourier series, power spectrum.
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