STATISTICS 804-4
Time Series Analysis

Spring 2006
DAY COURSE

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 604-291-3112 or csdo@sfu.ca

Instructor: Dr. R. Lockhart (SC K 10561)

Text:

Time Series Analysis and Its Applications by: Shumway and Stoffer, Publisher Springer-Verlag

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.
10. Estimation of power spectrum, smoothing, Gibbs phenomenon, tapering, filters.

Grading:

Assignments – 50%
Take Home Final – 50%

Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.

Revised October 2005