UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

Statistics 505 Time Series Analysis

(see Course Descriptions for the applicable academic year: http://www.ucalgary.ca/pubs/calendar/)

Reference Text: "*Time Series Analysis", Box,3rd Edition, Jenkins and Reinsel*,
"The Analysis of Time Series", 6th Edition. Chatfield.
(not necessarily a required text)

Syllabus

Topics	**Hours**
Multivariate Normal Distribution: moment generating functions, covariances, independence, correlation	3
Spectral Decomposition of Covariance: Bochner's Theorem.	3
Spectral Decomposition of Time Series: Proof using Hilbert Spaces, properties of the spectral measure.	9
Estimation of the Spectral Distribution: Periodograms	3
Moving Average processes: Hilbert space proof that all time series can be represented as a moving average process.	3
Linear Filters: Input output. Computation of the spectral density of the output in terms of the spectral density of the input.	3
AR(p), MA(q) and ARMA(p,q) Processes:	9
Prediction:	3
	36

Statistics 505 – Time Series
Course Outcomes

Learning Outcomes: Students finishing this course successfully are expected to have

1. describe and verify mathematical considerations for analyzing time series, including concepts of white noise, stationarity, autocovariance, autocorrelation

2. apply various techniques of time series models, including the seasonal autoregressive moving average (SARIMA) models, regression with ARMA models

3. apply various techniques for the modeling: including parameter estimation, assumption verification, and residual sequence diagnosis

4. verify the properties of linear predictor operator, and apply various linear forecasting techniques

5. describe and apply techniques of selected additional topics, such as spectral analysis, state space models, ARCH and GARCH, multivariate time series, principle component analysis, process control, and other topics.

6. Use R or SAS to construct time series models and conduct analysis

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