

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS

STAT 460: Time Series - Term 142 (3-0-3)

Course Objectives: Introduce basic concepts of time series. Stationary and Nonstationary models will be discussed. The focus will be on using statistical techniques and software for the analysis of real time series data. Forecasting techniques will also be taught in the course.

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Textbook: Time Series Analysis with Applications in R by Jonathan D. Cryer • Kung-Sik Chan, 2nd Edition, Springer, 2008.

Other Text: Diebold, F. X. (2014). Forecasting in Economics, Business, Finance and Beyond. 1st Edition, University of Pennsylvania, USA

Software Packages: EViews and R statistical language

Assessment

Assessment for this course will be based on homework, term report, 2 major exams and a comprehensive final exam, as in the following:

Activity	Weight
Attendance, Homework and Quizzes	10%
Term Project	15%
Exam 1 (Sunday, 08 Mar 2015)	20%
Exam 2 (Sunday, 03 May 2015)	20%
Final Exam (Tuesday, 26 May 2015) - Comprehensive	35%

Course Contents

Introduction to Time Series

- Types of data
- Components of Time Series
- Real life examples
- Time Series Analysis steps

Time Series Decomposition

Smoothing techniques

- Moving average
- Exponential weighted moving average

Trends

- Modeling and forecasting deterministic trend

Seasonality

- Modeling and forecasting deterministic seasonality

Stationary and non-stationary time series

Models for Stationary Time series

- MA models
- AR models
- ARMA models
- Inevitability
- Forecasting ARMA models

Models for Non-stationary Time series

- Stationary through differencing
- ARIMA models
- Forecasting ARIMA models

Model Specification

- Properties of Auto Correlation Function
- Properties of partial autocorrelation function

- Specification of some actual time series

Seasonal Models

- Seasonal MA
- Seasonal AR
- Seasonal ARIMA

Parameter Estimation

- Least square estimation
- Maximum Likelihood estimation

Model Diagnostics

- Residual Analysis