King Fahd University of Petroleum and Minerals
Department of Mathematics
STAT523: Forecasting Methods (Term 212)

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Office Hours: 4:00-5:00 pm (MS Teams)+ by appointment

STAT 523: Forecasting Methods **(3-0-3)**

Description: Time Series Basics; Autocorrelation; Modeling and forecasting with MA, AR, ARMA, ARIMA models; Seasonal and non-seasonal models; Model validation; Parameter selection; Smoothing and decomposition methods; Advanced forecasting methods, Multivariate models, State Space Models, Arch and Garch Models; projects using software(s).

Prerequisite: STAT 503
Note: Cannot be taken for credit with ISE 487

Course Objectives:
(i) Analyze the data observed over time using statistical tools
(ii) Develop forecasting models for the data observed over time
(iii) Implement forecasting models.

Textbook(s):
Diebold, F. X. (2007). Elements of Forecasting. 4th Edition, Thomson, South-Western, Mason OH, USA.
Cryer, J. D. and Chan, K. (2009). Time Series Analysis with Applications in *R*, 2nd Edition, Springer, New York, USA.

Supplementary Books/Material:
- Time Series Analysis and its Applications with R Examples by R. Shumway and D. Stoffer.

Software: MINITAB. (Click here to download: https://bit.ly/3IR6CuB)

Assessment

Activity	Weight
Classwork	20%
Midterm Exam (Week 7-8(tentative))	25%
Project	20%
Final Exam (Comprehensive) (As per registrar office announcement)	35%

Important Notes:

Blackboard: All contacts or announcements between the instructor and the students are supposed to be through Blackboard, so the student must check his Blackboard at least once a day.

Academic Integrity: All KFUPM policies regarding ethics and academic honesty apply to this course.

Attendance Notes: In accordance with University rules, 20% unexcused absences will automatically result in a grade of DN.

Missing an Exam: In case a student misses an exam for a legitimate reason (such as medical emergencies), he/she must bring an official excuse from Students Affairs. Otherwise, he will get zero in the missed exam.

Tentative list of Course Contents

Topics	Title
0	Introduction to Statistics and approaches of statistical analysis
1	Basics of Time Series (TS), TS components, TS forecasting and TS analysis (TSA)
2	Visualizing TS data and Exploratory data analysis (EDA)
3	Simple linear regression, its evaluation and Forecasting with regression
4	Autocorrelations: Random variables and time series, ACF and PACF
5	Deterministic Versus Stochastic Trends in Basic Time series model
6	Smoothing techniques and decomposition methods
7	Modeling with Stationary time series models: forecasting, General Linear Processes
8	Autoregressive methods
9	Parameter selection and model validation
10	Seasonal and non-seasonal TS models
11	Additive and Multiplicative models for forecasting
12	Advanced forecasting methods