



Course Specifications

Course Title:	Time Series and Forecasting
Course Code:	STAT 336
Program:	B. Sc
Department:	Statistics and Operations Research
College:	Science
Institution:	King Saud University

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A. Course Identification

1. Credit hours: 2
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Level 5 / 3 th year
4. Pre-requisites for this course (if any): STAT 215
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	60
2	Blended		
3	E-learning	√	40
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	15
3	Tutorial	
4	Others (specify)	
	Total	45

B. Course Objectives and Learning Outcomes

<p>1. Course Description</p> <p>Studying the statistical decision under uncertainty with or without data. Consider statistical inference (estimation and hypothesis testing) from the standpoint of statistical decision making.</p> <p><i>introduce more applications and use of real life data.</i></p> <p><i>extended usage of statistical packages in lectures or tutorial.</i></p> <p><i>build on the knowledge obtained from other courses like stat332, Stat438 and Stat439</i></p>
<p>2. Course Main Objective</p> <p><i>To provide students with the knowledge, methods and skills to analyze data that are collected over time. Also, the students through this course will be able to apply statistical methods to choose suitable models that best fit data. Those models can be used for control and prediction for future observations.</i></p>

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	<i>Define Basic features of a time series data.</i>	<i>Exams, Thematic Reports and Work Assignments Evaluation</i>
1.2	<i>Realize the required actions to be taken to prepare the data for analysis</i>	
1.3	<i>Define the autocorrelation and the partial autocorrelation structure of the data, and propose a suitable model for analysis</i>	
1.4	<i>Study the forecasting accuracy of the selected model(s)</i>	
2	Skills :	
2.1	<i>Develop the ability of how to utilize the theoretical concepts in application form</i>	<i>Peer and Instructor Evaluation Instructor Evaluation</i>
2.2	<i>Ability to Express Opinion and Criticize peers</i>	
2.3	<i>Ability to Bear Responsibility and Cope with Negative Criticism from Others.</i>	
2.4	<i>Ability to Use Information Media</i>	
3	Values:	
3.1	<i>Communicate with stakeholders and community</i>	
3.2	<i>Using IT for learning and simulation</i>	
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: Definitions and Examples. trend – seasonality – cyclical	2
2	Transformation: Differences method – Seasonal adjustment	2
3	Forecasting: How to forecast future - adequacy of a forecast - regression forecasting against time series forecasting	2
4	Some adequacy measures (MAD, MSE, MAPE).	2
5	Decomposition and smoothing of times series: moving averages - exponential smoothing	2
6	Stationary Time Series Models: Auto-Regressive processes (AR(1), AR(2), AR(p)), Moving Average processes (MA(1), MA(2), MA(q)), The mixed Autoregressive-Moving Average Model ARMA(p,q).	4
7	Forecasting: Minimum Mean Square Error Forecasts for ARMA and ARIMA models	4
8	Forecasting and prediction limits and updating forecasts.	2
9	ARIMA(p,d,q) models: Autocorrelation and partial autocorrelation functions - identification of appropriate model	4
10	Fitting models to real and simulated data sets. Diagnostic checks on the residuals.	2
11	Case studies: training on how to analyze real life data sets using the statistical package MINITAB - write reports	4
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	<i>Define Basic features of a time series data.</i>	Textbook	Mid-term exams
1.2	<i>Realize the required actions to be taken to prepare the data for analysis</i>	References	Home works
1.3	<i>Define the autocorrelation and the partial autocorrelation structure of the data, and propose a suitable model for analysis</i>	Notes	Final exam
2.0	Skills		
2.1	<i>Develop the ability of how to utilize the theoretical concepts in application form</i>		
2.2	<i>Ability to Express Opinion and Criticize peers</i>		
2.3	<i>Ability to Bear Responsibility and Cope with Negative Criticism from Others.</i>		
3.0	Values		
3.1			
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home works	1-14	25%
2	First mid-term test	6	10%
3	Second mid-term test	9	10%
	Project	11	10%
	Data analysis Project	12	25%
4	Final exam	16	20%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)
Office hours: 5 hours/ week
Communications by e- mail

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<i>Cryer, D. and Chan, K., Time Series Analysis, (latest edition), Springer.</i> - <i>Makridakis, S., Wheelright, S., and McGee, V., Forecasting, Methods and applications (latest edition), Wiley.</i> - <i>Chatfield, C., The Analysis of Time Series, (latest edition), Chapman and Hall</i>
Essential References Materials	Lectures' Notes.
Electronic Materials	Encouraging students to obtain related information from the Internet
Other Learning Materials	Lectures' Notes. Power point presentations and other handouts posted on the course web site.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	data show Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course evaluation	students	
Faculty – students general gathering		

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	