Term II (10 September – 09 December 2018)

Course Title: PREDICTIVE ANALYTICS USING TIME SERIES DATA

Course Code: BA018E

Credits: 3

Total Sessions: 24

Course Instructor: S. VAIDYANATHAN

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Course Link:

Office:

Office hours:

Course contributes mostly to: **Employability**/ Entrepreneurship/ Skill Development/ Value-add

Course Description

(Give overall perspective of the course)

The overall objective of this course is to provide a strong foundation in predictive analytics with special focus on time series data. The course covers a thorough discussion of the widely used time series techniques and their demonstration using industry-based data sets.

The course covers a reasonable curriculum in time series data analysis and forecasting

At the end of the course the student should be able to

1. Extract useful information from large and complex data sets

2. Recognize patterns and trends in the data bases and model them.

3. Use appropriate modeling tools from the set of classical methods, ARIMA, filters and other smoothing techniques, neural nets etc in order to arrive at accurate forecasts.

4. Use native Microsoft Excel worksheet functions and formulae as well as other in-built tools like Solver for time series data analysis.

5. Use the forecasts arrived at in effective managerial decision-making & communication, taking into account ethical, social and environmental concerns

Course Objectives (COs)

(Specify the skills/ benefits that students will build during the course. You can have 5 to 7 COs)

Alignment of course objectives (CO) with learning goals (LG) of Assurance of Learning

Each CO should be mapped to the five learning goals set for the MBA program. Below table is given for your reference and should be updated as per your course objectives. Please do not change LGs.

Here you have to mention in writing, how your course is going to contribute to each LG. You may specify the activities or assignments in the course that will ensure attainment of each LG (wherever relevant).

Change the values in the below table according to your Cos.

CO	Critical and integrative Thinking	Effective written and oral communication	Societal and Environmental Awareness	Ethical Reasoning	Leadership
Extract useful information from large and complex data sets	3	2	0	0	3
Recognize patterns and trends in the data bases and model them.	3	2	0	0	3
Use appropriate modeling tools from the set of classical methods, ARIMA, filters and other smoothing	3	3	2	1	2

techniques, neural nets etc in order to arrive at accurate forecasts					
Use native Microsoft Excel worksheet functions and formulae as well as other in-built tools like Solver for time series data analysis	3	2	0	0	0
Use the forecasts arrived at in effective managerial decision-making & communication, taking into account ethical, social and environmental concerns	3	3	2	3	3
CO6	2	0	0	0	0

Key: 3 – Highly relevant; 2 –Moderately relevant; 1 – Low relevance; 0- No relevance

Unit-wise scope for outcomes and Bloom's taxonomy

Please mention how your course is designed to focus on the Bloom's learning levels mentioned in the below table.

The course helps the student to Create (combine different pieces of information to arrive at one combined forecast and take a decision based on the same), Evaluate (different data sets and forecasting methods), Analyse (break down the information contained in data sets to its time series patterns & components), Apply (the time series concepts to arrive at appropriate forecasts), Understand (the trends contained in a data set as also the implication of the overall forecasts) and to a minor extent Remember (certain concepts used to recognize the data patterns).

The table below shows the relevant level(s) of learning enabled by each CO.

After the write-up, update the relevance in below box also.

Bloom's Levels of Learning ⟍ CO	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6
Creating	X				X	
Evaluating	X	X	X		X	
Analyzing		X	X	X		
Applying	X	X			X	
Understanding	X	X			X	
Remembering		X				

Structure of the course

The course structure – topics covered and the sequence of the same – are given inthe session-wise plan below

Pedagogy

The pedagogy consists of presentations by the instructor as well as students, quizzes (surprise/announced) and group assignments as well as exams. The learning and assessment happen on a continual basis throughout the duration of the course. A class session will typically consist of problem solving in the light of principles & concepts learnt in the class. Students are expected to complete reading the chapter/topic, preferably in advance of/before that class session, and thus come fairly, if not fully, prepared.

Laptops are used extensively. All assessments are online using the University's in-house academic management system AUMS. The students do have access to their notes, books or even the internet in most of the assessment exercises. This is made possible since the problems to be solved/questions to be answered are based entirely on their understanding of the concepts taught in the class sessions and ready-made solutions/answers cannot be obtained from the above-mentioned sources.

Assessment (Grading Policy: ABSOLUTE)

S. no	Assessment exercise	Description	Weight
Group assessment			
1	GA (Group Assignments)	*Each group (4-5 students per group) has to solve a few problems based on the concepts learnt, in a specified time limit. There are 2-3 GA's during the course*	20%
2			
3			
Individual Assessment			

1	Surprise/Announced Quizzes	*Multiple choice, objective type questions based on mostly theoretical concepts learnt in class. There may be a few simple problems to solve as well. Online, timed and may be unannounced or announced. Quizzes are conducted almost every week of the course*	20%
2	Midterm Exam	*Online exam administered through AUMS, covering approximately the first 50% of the course syllabus (as indicated in the session-wise plan). The question paper would contain problems to solve, using Microsoft Excel*	25%
3	End term	*Online exam administered through AUMS, covering the latter 50% of the course syllabus (as indicated in the session-wise plan). The question paper would contain problems to solve, using Microsoft Excel*	35%
4			

Course Requirements

The course is an elective, recommended for students with reasonable analytical skills and a taste for mathematical problem solving. Those who did well in the first year courses Data Analytics – I & Data Analytics – II would find it easier to pick up the concepts taught in this course. The students are also expected to be reasonably conversant with Microsoft Excel. Since the objective is to make the student software agnostic, no knowledge of any specialized software is necessary.

Course Text

Prescribed Textbooks for the course
1. Carlberg, Conrad (2015), "Predictive Analytics: Microsoft Excel", Que Publishing, ISBN- 978-0-7897-4941-3 **(PA)**
2. Carlberg, Conrad (2016), "More Predictive Analytics: Microsoft Excel", Que Publishing, ISBN - 978-0-7897-5614-5 **(MPA)**
3. Shmueli, Galit (2016), "Practical Time-series Forecasting : A Hands-on Guide (3rd Edition)", Axelrod Schnall Publishers, ISBN-13: 978-0991576654 **(PTSF)**

Session Plan (please add rows and columns as per your course requirements)

Session-Wise TENTATIVE COURSE SCHEDULE*

SESSION NO.	TOPICS TO BE COVERED	ASSIGNED READING
1	Introduction to Predictive Analytics	
2	Forecasting with Moving Averages	Ch 3, **PA**
3-4	Forecasting a Time Series: Smoothing	Ch 4, **PA**
5-6	Forecasting a Time Series: Trend Regression	Ch 5, **PA**
7	Group Assignment#1 + Quiz#1	
8-9	Time Series Decomposition	

MID-TRIMESTER EXAMINATION		
10-13	Logistic Regression	Ch 6 & 7, **PA**
14-17	Box-Jenkins ARIMA Models	Ch 9, **PA**
18	Group Assignment#2 + Quiz#2	
19-22	Neural Networks	Ch 9, **PTSF**
23	Group Assignment#3 + Quiz#3	Ch 9, **PTSF**
24	Miscellaneous Q&A	
END-TRIMESTER EXAMINATION		

*Tentative. Changes are possible based on the progress of the course

Contribution to Placements
(Please state how your course will help the student to get placed in a good company)

Analytics is a growing industry. Many of the bigger multinationals as well as smaller enterprises are looking for analytics professionals to further their competitive advantage in terms of productivity, efficiency, new product development etc. It is a major requirement in the services sector industries like banking, insurance etc. Hence, students with conceptual understanding of forecasting along with computer/software skills are in prime demand.