MS4212: PREDICTIVE ANALYTICS AND FORECASTING

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Predictive Analytics and Forecasting

Subject Code
MS - Department of Decision Analytics and Operations
Course Number
4212

Academic Unit
Department of Decision Analytics and Operations (DAOS)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MS3252 Regression Analysis

Precursors
MS3251 Analytics using SAS

Equivalent Courses
MS4212 Business Forecasting

Exclusive Courses
MS4102 Business Forecasting Methods

Part II Course Details

Abstract

This undergraduate course in predictive analytics and forecasting is designed to equip students with practical skills for tackling real-world business challenges. The curriculum focuses on developing students' ability to apply advanced analytical techniques to predict future trends and outcomes in various business scenarios. Through hands-on experience with industry-standard tools and methodologies, students will learn to collect, analyze, and interpret data to make informed business decisions.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the purpose and the procedure of conducting commonly used qualitative and quantitative predictive analytics and forecasting techniques and the difference among the techniques, and emerging use of internet time series data for forecasting	40	x	x	
2	Apply the concepts and methods of qualitative and quantitative techniques to solve predictive analytics and forecasting problems using contemporary computer software such as SAS, Excel, R, Python	60	x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Interactive Lectures	Students will actively participate in interactive lectures to develop a comprehensive understanding of the concepts and methods of commonly used qualitative and quantitative predictive analytics and forecasting techniques, with emphasis on real-life applications.	1, 2	

2	Computer Lab	Students will learn and practise the use of contemporary computer software (such as SAS, Excel, R, Python) to solve predictive analytics and forecasting problems and discuss the major issues arising from the applications and the use of computer software	1, 2	
3	Group Discussion and Collaboration	Students will apply knowledge learnt in the course to a selected group project topic, and develop collaborative learning and presentation skills.	1, 2	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test The test will assess the students' understanding of the fundamental concepts and methods.	1, 2	20	
2	Group Project The group project will demonstrate the students' ability to apply the knowledge learnt to real-world problems.	1, 2	30	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Test

Criterion

A test is given to assess students' professional knowledge of the concepts, the techniques and the applications they have learned in the past weeks.

Excellent (A+, A, A-)

Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair (C+, C, C-)

Some evidence of understanding of the subject; ability to perform basic statistical model building and data analysis for marketing research.

Marginal (D)

Adequate familiarity with the subject matter; shows marginal ability to perform basic statistical model building and data analysis for marketing research.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.

Assessment Task

Group project

Criterion

Students work in teams to apply the methods to solve the predictive analytics and forecasting problems using contemporary computer software such as SAS, Excel, R, Python and give verbal and written presentation of the problem and the findings.

Excellent (A+, A, A-)

Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior application of subject matter; evidence of extensive knowledge base. Highly effective use of language and excellent presentation skills.

Good (B+, B, B-)

Evidence of being able to apply the subject matter; evidence of critical capacity and analytic ability; reasonable understanding of issues; relevant use of literature. Effective use of language and good presentation skills.

Fair (C+, C, C-)

Some evidence of being able to apply the subject matter; some evidence of critical capacity and analytic ability; some evidence of understanding the issues; ability to develop solutions to simple problems. Adequate command of the language and presentation skills.

Marginal (D)

Sufficient ability to apply the subject matter to enable the student to progress without repeating the project. Inadequate command of the language and little presentation skills.

Failure (F)

Little or no evidence of being able to apply the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature. Poor use of the language and presentation skills.

Assessment Task

Written examination

Criterion

The examination is designed to assess students' professional knowledge of the concepts, the techniques and the applications they have learned in the whole course.

Excellent (A+, A, A-)

Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair (C+, C, C-)

Some evidence of understanding the subject; ability to develop solutions to simple problems.

Marginal (D)

Adequate familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.

Part III Other Information

Keyword Syllabus

Introduction

An overview of qualitative and quantitative predictive analytics and forecasting methods. Measuring Forecast accuracy. Naïve forecasting methods. Forecasting with internet time series data.

Smoothing and Decomposition Methods

Simple and double moving averages. Simple and double exponential smoothing. Smoothing models for seasonal data. Additive and multiplicative decomposition methods.

Regression Models

Forecasting using simple and multiple regression models.

ARIMA Time Series Models

Stationarity of time series. Transformation for achieving stationarity. Autocorrelations and partial autocorrelations. Autoregressive models. Moving average models. ARIMA models. Box-Jenkins methodology of model building.

Reading List

Compulsory Readings

	Title
1	Bowerman B L, O'connell R T and Koehler A B, Forecasting, Time Series and Regression: An Applied Approach, 4/e, Thomson, 2005
2	Hanke J E and Wichern D W, Business Forecasting, 9/e, Prentice Hall, 2014
3	Gilliland M, Sglavo U, Tashman L, Business Forecasting: Practical Issues and Solutions for Forecasters, John Wiley & Sons, 2015
4	Woodward W A, Gray H L and Elliott A C, Applied Time Series Analysis with R, Boca Raton, FL: CRC Press, 2017
5	Pal A, Prakash PKS, Practical Time Series Analysis: Master Time Series Data Processing, Visualization and Modeling with Python, Packt Publishing, 2017

Additional Readings

	Title
1	Abbott D A, Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst, 1/e, Wiley, 2014
2	Makridakis S, Wheelwright S C and Hyndman R J, Forecasting: Methods and Applications, 3/e (Paperback), Wiley, 2008
3	Montgomery D C, Jennings C L and Kulachi M, Introduction to time series analysis and forecasting, Wiley, 2015