

MS6219: PREDICTIVE MODELING AND FORECASTING FOR BUSINESS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Predictive Modeling and Forecasting for Business

Subject Code

MS - Decision Analytics and Operations

Course Number

6219

Academic Unit

Decision Analytics and Operations (DAOS)

College/School

College of Business (CB)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

MS5218 Applied Linear Statistical Models

Precursors

Nil

Equivalent Courses

MS6215 Forecasting Methods for Business

Exclusive Courses

Nil

Part II Course Details

Abstract

Throughout the course, students will develop a comprehensive understanding of various forecasting techniques. They will explore various smoothing methods, such as moving averages and exponential smoothing, to identify patterns and trends in time series data. Additionally, students will delve into Box-Jenkins models, a powerful approach for forecasting based on autoregressive integrated moving average (ARIMA) models. This will enable them to handle complex time series data and make accurate predictions. Moreover, students will learn about regression-based forecasting methods, emphasizing the use of regression analysis to model relationships between variables and generate forecasts.

Through lectures, practical exercises, and case studies, students will gain hands-on experience in applying these techniques to real-world business scenarios. By the end of the course, students will possess the necessary skills to analyze historical data, build predictive models, and generate reliable forecasts to support decision-making in a business context.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Apply forecasting techniques to solve business problems by analyzing historical data, selecting appropriate models, and generating accurate predictions.	40	x	x	x
2	Select the most suitable forecasting method for a given business problem by evaluating the characteristics of the data and considering the strengths and limitations of different techniques.	15		x	x
3	Evaluate the validity of statistical results and identify the limitations of forecasting techniques by critically analyzing the models, assessing their accuracy, and considering potential sources of error.	15	x		x
4	Implement forecasting techniques using relevant computer software to process and analyze data, build models, and generate forecasts.	20		x	
5	Communicate and explain the analysis and findings of forecasting models to non-specialists through clear and well-organized presentations or reports.	10		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	Lectures	Attend interactive lectures where the instructor explains the basic methodologies and techniques of forecasting, providing real-world examples to enhance my understanding. Engage in discussions during lectures, asking questions and challenging assumptions to deepen my understanding of forecasting concepts and their applications.	1, 2, 3	
2	Computer-based laboratories	Participate in computer-based lab sessions where I work with datasets and utilize specialized software to apply various forecasting techniques, analyzing and interpreting the results. Collaborate with peers in the computer-based lab to solve forecasting problems, sharing insights and discussing different approaches to enhance our understanding of the subject.	1, 2, 3, 4	
3	Project	Undertake a forecasting project where I apply various methodologies to analyze real-life business data and produce accurate predictions, presenting the project outcomes to the class. Reflect on the ethical implications of forecasting decisions made during the project, considering the potential impact on stakeholders and discussing ethical considerations with peers.	1, 2, 3, 4, 5	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Two assignments	1, 2, 3	20	-	Yes
2	Project	1, 2, 3, 4, 5	30	-	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Additional Information for ATs

Examination: CILO No. 1,2,3.

Assessment Rubrics (AR)**Assessment Task**

Two assignments

Criterion

Knowledge in the technical aspects of the subjects and their relevance to business applications

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Project (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to conduct analysis using appropriate techniques and explain results to business practitioners

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Knowledge in the technical aspects of the subjects and their relevance to business applications

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Test (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Knowledge in the technical aspects of the subjects and their relevance to business applications

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to conduct analysis using appropriate techniques and explain results to business practitioners

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Knowledge in the technical aspects of the subjects and their relevance to business applications

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

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Part III Other Information

Keyword Syllabus

1. Forecasting Goal; Data Characterization; Evaluating Predictive Accuracy

2. Smoothing-Based Forecasting Methods

Moving Average; Detrending and Seasonal Adjustment; Exponential Smoothing (Simple, Double and Seasonal).

3. Fourier Series Forecasting Models

Cyclical Movement; Spectral Density Function; Periodogram.

4. Regression-Based Forecasting Methods

Capturing Trend and Seasonality with Linear Regression; Forecasting with Autocorrelation; Seemingly Unrelated Regression Equations.

5. Box-Jenkins (ARIMA) Models

Autoregressive (AR), Moving Average (MA), ARMA and ARIMA processes; Stationarity and Invertibility, Random Walk; Autocorrelation and Partial Autocorrelation Functions, Identification of Models, Estimation of Parameters, Diagnostic Checking and Model Selection.

6. Predictive Analytics in Practice

Communicating Predictive Analytics to stakeholders; Forecasting Implementation Issues; Subjective and Naive Forecasts.

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Abelson P and Joyeux R, Economic Forecasting, Allen and Unwin, 2000
2	Bowerman, B L, O'Connell, R and Koehler A, Forecasting, Time Series and Regression, 4/e, South-Western College Publishing, 2004
3	Hanke J E and Wichern D, Business Forecasting, 9/e, Prentice Hall, 2008
4	Kuhn M and Johnson K, Applied Predictive Modeling Springer, 2013