City University of Hong Kong
Course Syllabus

offered by Department of Management Sciences
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	Predictive Modeling and Forecasting for Business
Course Code:	MS6219
Course Duration:	One semester
Credit Units:	3
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	MS5218 Applied Linear Statistical Models
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	MS6215 Forecasting Methods for Business
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. 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.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Apply forecasting techniques to solve business problems by analyzing historical data, selecting appropriate models, and generating accurate predictions.	40%	✓	✓	✓
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%		✓	✓
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%	✓		✓
4.	Implement forecasting techniques using relevant computer software to process and analyze data, build models, and generate forecasts.	20%		✓	
5.	Communicate and explain the analysis and findings of forecasting models to non-specialists through clear and well-organized presentations or reports.	10%		✓	✓
		100%			

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.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5		
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.	✓	✓	✓				
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.	✓	✓	✓	✓			
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.	✓	✓	✓	✓	✓		

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4	5			
Continuous Assessment: 35 %								
Test	✓	✓	✓				20%	
Project	✓	✓	✓	✓	✓		15%	
Examination: 65 % (duration: 3 hours, if applicable)								
Examination	✓	✓	✓				65%	
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	Knowledge in the technical aspects of the subjects and their relevance to business applications	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Project	Ability to conduct analysis using appropriate techniques and explain results to business practitioners	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Knowledge in the technical aspects of the subjects and their relevance to business applications	High	Significant	Moderate	Basic	Not even reaching marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Test	Knowledge in the technical aspects of the subjects and their relevance to business applications	High	Significant	Moderate	Not even reaching marginal levels
2. Project	Ability to conduct analysis using appropriate techniques and explain results to business practitioners	High	Significant	Moderate	Not even reaching marginal levels
3. Examination	Knowledge in the technical aspects of the subjects and their relevance to business applications	High	Significant	Moderate	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

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.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Nil

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

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