

**City University of Hong Kong
Course Syllabus**

**offered by Department of Management Sciences
with effect from Semester A 2022/23**

Part I Course Overview

Course Title:	<u>Predictive Modeling in Marketing</u>
Course Code:	<u>MS6221</u>
Course Duration:	<u>One semester</u>
Credit Units:	<u>3</u>
Level:	<u>P6</u>
Medium of Instruction:	<u>English</u>
Medium of Assessment:	<u>English</u>
Prerequisites: <i>(Course Code and Title)</i>	<u>MS5218 Applied Linear Statistical Models</u>
Precursors: <i>(Course Code and Title)</i>	<u>Nil</u>
Equivalent Courses: <i>(Course Code and Title)</i>	<u>MS6218 Statistical Modelling in Marketing Engineering</u>
Exclusive Courses: <i>(Course Code and Title)</i>	<u>Nil</u>

Part II Course Details

1. Abstract

The goal of the class is to provide a broad overview of modern data-driven marketing techniques. We will cover the main areas of marketing that require data-driven decisions — targeted promotions and advertisements, churn management, recommender systems, pricing, and demand prediction. The emphasis is on applied predictive modeling in python, and how machine learning tools are employed in the data science industry. The prerequisites include one course in probability and statistics and one course in regression analysis. Students are expected to work at least 5 hours after every lecture.

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.	Basic Programming Concepts in python	20%	✓	✓	
2.	Knowledges in Predictive Modeling	40%		✓	
3.	Knowledges in Marketing Data Science	40%		✓	✓
		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 self-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. Teaching and Learning Activities (TLAs)
(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Classroom Lectures	Regular lecture and demonstration.	✓	✓	✓	
Computer Lab Tutorials	Students practice python programming.	✓	✓		
Group Assignment	Coding together in a team.	✓	✓	✓	

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					
Continuous Assessment: <u>100</u> %								
Assignment	✓	✓	✓				40%	
In-Class Midterm		✓	✓				30%	
Project	✓	✓	✓				30%	
Examination: <u>0</u> % (duration: hours, if applicable)								
							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 in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
Assignment	Core concepts and ideas; use of appropriate statistical methods	High	Significant	Moderate	Fail to understand the core concepts
In-Class Midterm	Core concepts and ideas; use of appropriate statistical methods	High	Significant	Moderate	Fail to understand the core concepts
Project	Core concepts and ideas; use of appropriate statistical methods	High	Significant	Moderate	Fail to understand the core concepts

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Assignment	Core concepts and ideas; use of appropriate statistical methods	High	Significant	Moderate	Basic	Not even reaching marginal levels
In-Class Midterm	Core concepts and ideas; use of appropriate statistical methods	High	Significant	Moderate	Basic	Not even reaching marginal levels
Project	Core concepts and ideas; use of appropriate statistical methods	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information

1. Keyword Syllabus

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

1. Introduction
 - Introduction to Data-Driven Marketing
 - Introduction to python
 - Linear Regression in python

2. Predictive Modeling Overview
 - Model Selection and Cross-Validation
 - Lasso, Ridge, and Elastic Net Regularization
 - Principal Component Analysis
 - K-means Clustering
 - Logistic Regressions

3. Promotions and Advertisements
 - Modern Targeting Methods using Machine Learning
 - Recency-Frequency-Monetary (RFM) Analysis
 - Customer Lifetime Value and Retention (Churn Management)
 - Predictive Modeling and Customer Acquisition
 - Measuring the Effectiveness (A/B testing)

4. Recommender Systems
 - Quantitative Metrics for Evaluation
 - Content-based Filtering
 - Collaborative Filtering

5. Pricing and Demand Prediction
 - Demand and Price Elasticity
 - Price Structure and Segmentation
 - Forecasting Demand using Machine Learning

2. Reading List

2.1 Compulsory Readings

Nil

2.2 Additional Readings

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

1.	James, Gareth, Daniela Witten, Trevor Hastie, and Robert Tibshirani. An introduction to statistical learning: with Applications in R. Springer, 2017. This is a good book about machine learning algorithms, examples are demonstrated in R.
2.	Müller, Andreas C., and Sarah Guido. Introduction to machine learning with Python: a guide for data scientists. " O'Reilly Media, Inc.", 2016. This is a good book about machine learning with Python.
3.	Rossi, Peter E., Greg M. Allenby, and Rob McCulloch. Bayesian statistics and marketing. John Wiley & Sons, 2012. This book covers some concepts of quant marketing and Bayesian statistics.