MA1006: CALCULUS AND LINEAR ALGEBRA FOR BUSINESS

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Calculus and Linear Algebra for Business

Subject Code
MA - Mathematics
Course Number
1006

Academic Unit
Mathematics (MA)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
3

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

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
HKDSE Mathematics Compulsory Part, or equivalent
Notes to Students: Students with HKDSE Mathematics Extended Part Module 2 (Levels 3 –5) are suggested not to take this course.

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
MA1200 Calculus and Basic Linear Algebra I
MA1201 Calculus and Basic Linear Algebra II
MA1300 Enhanced Calculus and Linear Algebra I

MA1301 Enhanced Calculus and Linear Algebra II

Part II Course Details

Abstract

This course is designed for students pursuing studies in business and related fields. It aims to

- develop fluency in the concepts and techniques of calculus and linear algebra, and
- provide students with mathematical training for all further study in business and related fields.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	describe properties of functions and manipulate expressions involving standard functions and their inverses.	17	x		
2	explain concepts of limit, continuity and differentiability of functions.	17		x	
3	perform techniques of integration to evaluate integrals of functions.	22		x	
4	implement techniques of matrix arithmetic and of solving systems of linear equations	22		x	x
5	apply methods of differential and integral calculus and linear algebra to solve optimization problems, evaluate present value of income streams, solve input-output models and other applications in business and related fields.	22	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	Learning through teaching is primarily based on lectures.	1, 2, 3, 4, 5	39 hours in total
2	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	1, 2, 3, 4, 5	3 hours

3	Assignments	Learning through take-home assignments helps students implement basic concepts of functions and techniques of differential calculus, as well as apply knowledge of which to problems in business and related fields.	1, 2, 3, 4, 5	after class
4	Math Help Centre	Learning activities in Math Help Centre provides students extra assistance in study.	1, 2, 3, 4, 5	after-class,depending on need

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes/Test/Midterm	1, 2, 3, 4, 5	15	Questions are designed to see how well students have learned basic mathematical methods, techniques and applications of differential calculus and linear algebra. These assessment tasks monitor students' progress and reveal gaps in knowledge.
2	Formative take-home assignments	1, 2, 3, 4, 5	15	These are skills based assessment to see whether students are familiar with essential mathematical methods, techniques and applications of differential calculus and linear algebra.

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task

1. Quizzes/Test/Midterm

Criterion
1.1 CAPACITY of EXPLAIN and APPLY concepts and methods of calculus and linear algebra.

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
2. Formative take-home assignments

Criterion
2.1 CAPACITY of SELF-DIRECTED LEARNING to understand the main concepts of calculus and linear algebra and master the mathematical techniques involved.

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
3. Examination

Criterion
3.1 ABILITY to APPLY mathematical techniques and theories to solve problems involving the intended learning outcomes.

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

Part III Other Information

Keyword Syllabus

A) Functions, limits, continuity and differentiability
B) Techniques of differentiation, implicit and parametric differentiation
C) Applications of differentiation: rates of change, local extrema, optimization problems, Taylor series, l’ Hôpital’ s rule
D) Definite and indefinite integrals; techniques of integration, integration of rational functions, integration by substitution, integration by parts
E) Applications of integration: present value, accumulated net profit
F) Matrices; determinants, systems of linear equations, Gaussian elimination, matrix inverses, Gauss-Jordan elimination
G) Applications of linear algebra: input-ouput models.

Reading List

Compulsory Readings

	Title
1	Ron Harshbarger and Jim Reynolds, Mathematical Applications for the Management, Life, and Social Sciences,10th ed., Cengage Learning, 2012
2	Laurence Hoffman and Gerald Bradley, Calculus for Business, Economics, and the Social and Life Sciences, 11th ed., McGraw-Hill, 2012.

Additional Readings

	Title
1	Nil