City University of Hong Kong
Course Syllabus

offered by College/School/Department of __Mathematics__
with effect from Semester __B__ 20_17_ / _18_

Part I   Course Overview

Course Title:	**Calculus and Linear Algebra for Business**
Course Code:	**MA1006**
Course Duration:	**1 semester**
Credit Units:	**3 CUs**
Level:	**B1**
Proposed Area: *(for GE courses only)*	☐Arts and Humanities ☐Study of Societies, Social and Business Organisations ☐Science and Technology
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**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: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**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

1. Abstract
(A 150-word description about the course)

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.

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.	describe properties of functions and manipulate expressions involving standard functions and their inverses.	17%	✓		
2.	explain concepts of limit, continuity and differentiability of functions.	17%		✓	
3.	perform techniques of integration to evaluate integrals of functions.	22%		✓	
4.	implement techniques of matrix arithmetic and of solving systems of linear equations	22%		✓	✓
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%	✓		✓
	* If weighting is assigned to CILOs, they should add up to 100%.	100%			

 # Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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	4	5		
Lectures	Learning through **teaching** is primarily based on lectures.	✓	✓	✓	✓	✓		39 hours in total
Tutorials		✓						2 hours
			✓					2 hours
	Learning through **tutorials** is primarily based on interactive problem solving allowing instant feedback.			✓				3 hours
					✓			3 hours
						✓		3 hours
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.	✓	✓	✓	✓	✓		after class
Math Help Centre	Learning activities in **Math Help Centre** provides students extra assistance in study.	✓	✓	✓	✓	✓		after-class, depending on need

4. Assessment Tasks/Activities (ATs)
(ATs are designed to assess how well the students achieve the CILOs.)

30% Coursework

70% Examination (Duration: 2 hours, at the end of the semester)

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

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5			
Continuous Assessment: _30___%								
Quizzes/Test(s)	✓	✓	✓	✓	✓		15 – 30%	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.
Hand-in assignment(s)	✓	✓	✓	✓	✓		0 – 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.
Examination: _70___% (duration: 2 hrs , if applicable)								Examination questions are designed to see how far students have achieved their intended learning outcomes. Questions will primarily be skills based to assess the extent to which students have mastered methods of the course and synthesized mathematical knowledge in practical applications.
The weightings should add up to 100%.							100%	

5. Assessment Rubrics

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

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Quizzes/ Test(s)	1.1 CAPACITY of EXPLAIN and APPLY concepts and methods of calculus and linear algebra.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignment(s)	2.1 CAPACITY of SELF-DIRECTED LEARNING to understand the main concepts of calculus and linear algebra and master the mathematical techniques involved.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	3.1 ABILITY to APPLY mathematical techniques and theories to solve problems involving the intended learning outcomes.	High	Significant	Moderate	Basic	Not even reaching marginal levels
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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.)

   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.

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.)

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.
3.	
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2.2   **Additional Readings**
     (Additional references for students to learn to expand their knowledge about the subject.)

1.	Nil
2.	
3.	
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