City University of Hong Kong
Course Syllabus

offered by College/School/Department of _Mathematics_____
with effect from Semester __A____ 20_20_ / _21_

Part I Course Overview

Course Title:	**Calculus and Basic Linear Algebra I**
Course Code:	**MA1200**
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)*	**(i) HKDSE Mathematics Compulsory Part, or** **(ii) HKDSE Mathematics Compulsory Part and Extended Part Module 1, or** **(iii) HKDSE Mathematics Compulsory Part and Extended Part Module 2 (Levels 1 – 3); or equivalent** ***Notes to Students: Students with HKDSE Mathematics Extended Part Module 2 (Levels 4 –5) are required to take MA1300 instead.***
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**MA1300 Enhanced Calculus and Linear Algebra I**
Exclusive Courses: *(Course Code and Title)*	**MA1006 Calculus and Linear Algebra for Business** **MA1508 Calculus**

Part II Course Details

1. Abstract

(A 150-word description about the course)

This is the first of two required courses designed for students pursuing studies in **engineering** or **science**. It aims to

- equip students with mathematical skills and methods essential for study of calculus and linear algebra,
- develop fluency in concepts and techniques from **differential calculus**, and
- provide students with mathematical training for all further study in science/engineering and its applications.

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.	implement basic mathematical techniques of algebra, trigonometry and coordinate geometry.	20%	✓	✓	
2.	describe properties of functions and manipulate expressions involving standard functions and their inverses.	15%	✓		
3.	explain concepts of limit, continuity and differentiability of functions.	15%	✓		
4.	perform techniques of differentiation to obtain derivatives and Taylor series expansions of functions.	25%	✓	✓	
5.	apply methods of differential calculus to dynamical and optimization problems as well as applications in science and engineering.	25%		✓	✓
		100%			

** If weighting is assigned to CILOs, they should add up to 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 (A/B); 46 hours in total (C/D)
Tutorials	Learning through **tutorials** is primarily based on interactive problem solving allowing instant feedback.	✓						3 hours in total (A/B); 4 hours in total (C/D)
			✓					2 hours in total (A/B); 3 hours in total (C/D)
				✓				2 hours in total (A/B); 3 hours in total (C/D)
					✓			3 hours in total (A/B); 5 hours in total (C/D)
						✓		3 hours in total (A/B); 4 hours in total (C/D)
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 science and engineering.	✓	✓	✓	✓	✓		after class
Online applications	Learning through **online examples for applications** helps students apply methods of differential calculus to practical problems in science and engineering.					✓		after class

4. Assessment Tasks/Activities (ATs)

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

30% Coursework

70% Examination (Duration: 3 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___%								
Test 1	✓	✓					15%	Questions are designed to see how well students have learned basic mathematical methods, concepts of functions, limits and continuity, as well as techniques and applications of differential calculus. These assessment tasks monitor students' progress and reveal gaps in knowledge.
Test 2			✓	✓	✓		15%	
Hand-in assignment(s)	✓	✓	✓	✓	✓		0%	These are skills based assessment to see whether students are familiar with essential mathematical methods, properties of functions, techniques and applications of differential calculus.
Examination: (duration: 3 hours)	✓	✓	✓	✓	✓		70%	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
** 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)	The test consists of two 1-hour test papers. In each test paper, there are six short questions. All questions must be attempted. Since it is important for students to reach an understanding of all the basic mathematical concepts and acquire manipulating skills on all mathematical techniques of the course, a minimum standard of 50% must be achieved in each test.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignment(s)	For students with test score <50 marks, they are required to complete remedial work to the satisfaction of the Lecturer.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	The examination will consist of one 3-hour paper. It will contain two sections. Section A (70%) consists of 7 short	High	Significant	Moderate	Basic	Not even reaching marginal levels

	questions while Section B (30%) consists of 2 long questions. All questions must be attempted. The examination is designed to find out the proficiency and the degree of understanding of the students in mastering the course materials. Thus, it is more demanding than the two tests.					
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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) Polynomials; Mathematical induction; Binomial theorem
B) Coordinate geometry and conic sections; Basic trigonometry
C) Functions and inverses; Limits, continuity and differentiability
D) Techniques of differentiation, implicit, logarithmic and parametric differentiation; Successive differentiation
E) Applications of differentiation: rate of change, local extrema, optimization problems, Taylor series, l'Hôpital rule

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.	For further detailed information, please access the course materials via http://www6.cityu.edu.hk/ma/ug/serv/ma1200.htm
2.	
3.	
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2.2 Additional Readings

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

1.	Frank Ayres, Jr. and Elliott Mendelson, *Calculus (Schaum's Outlines)*, 6th ed., McGraw Hill, 2013
2.	Fred Safier, *Precalculus (Schaum's Outlines)*, 3rd ed., McGraw Hill, 2013
3.	*Basic Calculus and Linear Algebra* (Compiled by Department of Mathematics, City University of Hong Kong), Pearson Custom Publishing, 2007
4.	Ron Larson and Bruce Edwards, *Calculus I with Precalculus: A One-Year Course*, 3rd ed., Brooks/Cole, 2012
5.	C. Henry Edwards and David E. Penney, *Calculus: Early Transcendentals*, 7th ed., Pearson Prentice Hall, 2008
6.	Robert A. Adams, *Calculus: A Complete Course*, 6th ed., Pearson Addison Wesley, 2006
7.	Glyn James, *Modern Engineering Mathematics*, 4th ed., Pearson Prentice Hall, 2008