City University of Hong Kong
Course Syllabus

offered by College/School/Department of _Mathematics_____
with effect from Semester __A____ 20_19_ / _20_

Part I Course Overview

Course Title:	**Calculus**
Course Code:	**MA1508**
Course Duration:	**1 Semester**
Credit Units:	**4 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**
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 is the course on calculus designed for students pursuing studies in science and related fields requiring solid background in mathematics. It aims to

- equip students with mathematical skills and methods essential for study of calculus,
- develop fluency in concepts and techniques for **limits**, **differential calculus**, and **integral calculus**,
- provide students with mathematical training for all further studies in science 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.	Explain properties and theories of differential and integral calculus	10%		✓	
2.	Explain concepts of limit, continuity, differentiability and integral of functions	10%	✓		
3.	Perform techniques of differentiation to obtain derivatives and Taylor series expansions of functions	20%	✓	✓	
4.	Perform techniques of integration to evaluate integrals of functions	20%	✓	✓	
5.	Apply methods of differential and integral calculus to applications in science and engineering	20%		✓	✓
6.	The combination of CILOs 1 – 5	20%	✓	✓	✓
		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	6	
Lectures	Learning through **teaching** is primarily based on lectures.	✓	✓	✓	✓	✓	✓	39 hours in total
Tutorials	Learning through **tutorials** is primarily based on interactive problem solving allowing instant feedback.	✓						3 hours in total
			✓					2 hours in total
				✓				2 hours in total
					✓	✓		4 hours in total
							✓	2 hours in total
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	6		
Continuous Assessment: _30___%								
Quizzes /Test(s)	✓	✓	✓	✓	✓	✓	25%	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.
Hand-in assignment(s)	✓	✓	✓	✓	✓	✓	5%	These are skills based assessment to see whether students are familiar with essential mathematical methods.
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 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)	Understanding of the basic concepts and theory of calculus.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignment(s)	Test the capacity of self-directed learning to understand the course material. Students are required to complete the hand-in assignment in time 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. The examination is designed to assess the proficiency and the degree of understanding and mastering the course materials.	High	Significant	Moderate	Basic	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.)

A) Functions and inverses

B) Limits, continuity and differentiability of functions

C) Techniques of differentiation, chain rule, implicit and parametric differentiation

D) Applications of differentiation: rate of change, local extrema, optimization problems, Taylor series, l'Hôpital rule

E) Definite and indefinite integrals; techniques of integration: integration by substitution, integration by parts

F) Applications of integration: area, length of curve

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.	Maurice D. Weir, Thomas Calculus: Early Transcendental, 10th ed., Pearson 2014
2.	Stewart J., Calculus: Early Transcendentals, 8th ed., Cengage Learning, 2016

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.	Ron Larson and Bruce Edwards, *Calculus I with Precalculus: A One-Year Course*, 3rd ed., Brooks/Cole, 2012
4.	C. Henry Edwards and David E. Penney, *Calculus: Early Transcendentals*, 7th ed., Pearson Prentice Hall, 2008
5.	Robert A. Adams, *Calculus: A Complete Course*, 6th ed., Pearson Addison Wesley, 2006
6.	Glyn James, *Modern Engineering Mathematics*, 4th ed., Pearson Prentice Hall, 2008