City University of Hong Kong
Course Syllabus

offered by College/School/Department of _Mathematics_____
with effect from Semester __A____ 20_18_ / _19_

Part I Course Overview

Course Title:	**Enhanced Calculus and Linear Algebra I**
Course Code:	**MA1300**
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 and Extended Part Module 1 (Level 5), or** **(ii) HKDSE Mathematics Compulsory Part and Extended Part Module 2 (Levels 3 – 5); or equivalent**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**MA1200 Calculus and Basic Linear Algebra I** **MA1006 Calculus and Linear Algebra for Business** **MA1100 Foundation Mathematics I,**
Exclusive Courses: *(Course Code and Title)*	**MA1001 Higher Mathematics I(A)** **MA1002 Higher Mathematics I(B)** **MA1003 Higher Mathematics II(A)** **MA1004 Higher Mathematics II(B)**

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 **mathematics**, or **engineering/science** students requiring *solid background* in mathematics. It aims to

- strengthen skills and methods essential for study of further mathematics,
- develop fluency in concepts of **limits** and techniques of **differential calculus**, and
- nurture skills in logical thinking and translation of ideas with formal mathematical language.

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 mathematical methods of algebra, trigonometry and coordinate geometry proficiently.	16%		✓	✓
2.	explain properties of functions and manipulate expressions involving standard functions and their inverses.	16%	✓		✓
3.	apply concepts and theory of sequences to evaluate their limits.	20%	✓	✓	
4.	describe concepts on infinite series and test their convergence/divergence.	16%	✓		
5.	explain at high level concepts of limit, continuity and differentiability of functions.	16%	✓		
6.	perform techniques of differentiation to obtain derivatives of functions.	16%		✓	
		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.)

Students are assigned to lecture sessions according to mathematical background and/or results in HKDSE mathematics.
Students in Section B benefit from extra tuition hours.

HKDSE Mathematics			**Section**
Compulsory Part	**Module 1 (Level 5)**	**Module 2**	
✓		✓ (Levels 4 – 5)	**A**
✓		✓ (Levels 1 – 3)	**B**
✓	✓		**B**
New Foundation Year of CSE			**A**

Note: ✓ = passed

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 (A); 46 hours in total (B)
Tutorials	Learning through **tutorials** is primarily based on interactive problem solving allowing instant feedback.	✓						2 hours in total (A); 3 hours in total (B)
			✓					2 hours in total (A); 3 hours in total (B)
				✓				3 hours in total (A); 4 hours in total (B)
					✓			2 hours in total (A); 3 hours in total (B)
						✓		2 hours in total (A); 3 hours in total (B)
							✓	2 hours in

								total (A); 3 hours in total (B)
	Learning through **take-home assignments** helps students implement concepts of functions and limits, evaluate limits of sequences, series and functions, test for convergence/divergence of series as well as apply techniques of differential calculus.	✓	✓	✓	✓	✓	✓	after class
	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: 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)	✓	✓	✓	✓	✓	✓	15 – 30%	Questions are designed to see how well students have learned basic mathematical methods, concepts of functions, limits, continuity and differentiability, as well as techniques of differential calculus. 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 techniques, properties of functions, theory and methods of limits of sequences and series as well as techniques of differential calculus.
Examination: _70___% (duration: 3 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 more sophisticated problems.
** 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 differential calculus.	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 differential calculus 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
…						

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
B) Coordinate geometry and conic sections; Basic trigonometry
C) Functions and inverses
D) Limits of sequences and infinite series
E) Limits, continuity and differentiability of functions
F) Techniques of differentiation, implicit, logarithmic and parametric differentiation; Successive differentiation

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.	http://www6.cityu.edu.hk/ma/ug/serv/ma1300.htm
2.	
3.	
…	

2.2 Additional Readings

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

1.	James Stewart, *Single Variable Calculus*, 7th ed., BROOKS/COLE CENGAGE Learning, 2012
2.	*Basic Calculus and Linear Algebra* (Compiled by Department of Mathematics, City University of Hong Kong), Pearson Custom Publishing, 2007
3.	C. Henry Edwards and David E. Penney, *Calculus: Early Transcendentals*, 7th ed., Pearson Prentice Hall, 2008
4.	Robert A. Adams, *Calculus: A Complete Course*, 6th ed., Pearson Addison Wesley, 2006