

City University of Hong Kong
Course Syllabus

offered by College/School/Department of Mathematics
with effect from Semester B 2017 / 18

Part I Course Overview

Basic Engineering Mathematics I

Course Title:

Course Code:

Course Duration:

Credit Units:

Level:

Proposed Area:
(for GE courses only)

Medium of Instruction:

Medium of Assessment:

Prerequisites:
(Course Code and Title)

Precursors:
(Course Code and Title)

Equivalent Courses:
(Course Code and Title)

Exclusive Courses:
(Course Code and Title)

MA0101

1 semester

3 CUs

A1

- Arts and Humanities
 Study of Societies, Social and Business Organisations
 Science and Technology

English

English

HKDSE Mathematics Compulsory Part (Level 2 or above), or
HKCEE Mathematics (Grade E or above) or equivalent

Nil

BST10514 Engineering Mathematics and Computation 1/
BST10126 Computational Mathematics

Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims to:

- provide students with a basic understanding of complex numbers, vector algebra and calculus,
- enable students to understand mathematical formulations and its engineering applications, and
- develop students' skills to analyze engineering problems quantitatively.

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.	manipulate expressions and equations involving complex numbers.	15%		✓	
2.	implement basic operations in vector algebra, dot and cross products.	15%		✓	
3.	perform techniques of differentiation to obtain derivatives and Taylor series expansions of functions.	25%		✓	
4.	perform techniques of integration to evaluate integrals of functions.	25%		✓	
5.	apply methods of differential and integral calculus to a range of geometrical and engineering problems.	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	
Lectures	Learning through teaching is primarily based on lectures.	✓	✓	✓	✓	✓	32.5 hours in total
Tutorials	Learning through tutorials is	✓					3 hours

	primarily based on interactive problem solving allowing instant feedback.		✓						2 hours
				✓					3 hours
					✓				3 hours
						✓			2 hours
Assignments	Learning through take-home assignments helps students understand basic concepts and techniques of complex numbers, vector arithmetic and calculus, and some applications in science and engineering.	✓	✓	✓	✓	✓			after-class
Online applications	Learning through online examples for applications helps students apply mathematical and computational methods to some problems in engineering applications.					✓			after-class

4. Assessment Tasks/Activities (ATs)

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

40% Coursework

60% 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: <u>40</u> %							
Test	✓	✓	✓			20-40%	Questions are designed for the first part of the course to see how well the students have learned concepts and techniques of complex numbers, vector algebra and differential calculus.
Hand-in assignments	✓	✓	✓	✓	✓	0-20%	These are skills based assessment to see whether the students are familiar with concepts and techniques of complex numbers, vector

								arithmetic, differential and integral calculus as well as some applications in engineering.
Examination: <u>60</u> % (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 and understanding based to assess the student's versatility in complex numbers, vector algebra, elementary calculus as well as their applications in geometrical and physical 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. Test	Ability to understand the concepts and techniques of complex numbers, vector algebra and differential calculus	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	Ability to explain concepts and techniques of complex numbers, vector arithmetic, differential and integral calculus as well as some applications in engineering.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Ability to show student's versatility in complex numbers, vector algebra, elementary calculus as well as their applications in geometrical and physical problems	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) Complex numbers: polar form and Cartesian form, Euler relation;
- B) Vectors: dot product, cross product; triple scalar product
- C) Differentiation: product rule, quotient rule, chain rule, Leibnitz rule; Applications: local extrema, Taylor series;
- D) Definite and indefinite integrals: integration by substitution, integration by parts; Applications: area of the region bounded by the curves.

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.	
2.	
3.	
...	

2.2 Additional Readings

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

1.	
2.	
3.	
...	