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:	**Basic Engineering Mathematics II**
Course Code:	**MA0102**
Course Duration:	**1 semester**
Credit Units:	**3 CUs**
Level:	**A2**
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)*	**Nil**
Precursors: *(Course Code and Title)*	**MA0101 Basic Engineering Mathematics I**
Equivalent Courses: *(Course Code and Title)*	**BST20515 Engineering Mathematics and Computation 2**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims to:

- introduce concepts and techniques from linear algebra**,** and
- enable students to solve engineering problems from ordinary differential equations, Laplace transforms and Fourier series, 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.	perform basic operations of matrix arithmetic and techniques for solving systems of linear equations.	20	√	√	
2.	solve first-order linear and special types of non-linear ordinary differential equations.	15	√	√	
3.	solve second-order linear differential equations with constant coefficients.	20	√	√	
4.	implement techniques in Laplace transforms and Fourier series.	30	√	√	
5.	apply mathematical and computational methods to a range of problems in science and engineering.	15			√
		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
			✓					2 hours

	primarily based on interactive problem solving allowing instant feedback.			✓				3 hours
					✓			4 hours
						✓		1 hour
Assignments	Learning through **take-home assignments** helps students understand basic concepts and techniques of linear algebra, ordinary differential equations, Laplace transforms and Fourier series, as well as 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
Math Help Centre	Learning activities in **Math Help Centre** provides students extra help.	✓	✓	✓	✓			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: __40__%								
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 linear algebra and ordinary differential equations.
Hand-in assignments	✓	✓	✓	✓	✓		0-20%	These are skills based assessment to see whether the students

								are familiar with concepts and techniques of linear algebra, ordinary differential equations, Laplace transforms and Fourier series, as well as some applications in engineering.
Examination: _60___% (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 linear algebra, ordinary differential equations, as well as applications of Laplace transforms and Fourier series in mathematical and engineering 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	utilize concepts from linear algebra and ordinary differential to solve problems relevant to engineering	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	evaluate and implement Fourier series and Laplace transforms techniques	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Design solution strategies and then utilize appropriate methods to solve science and engineering problems	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) Matrices, determinants, Systems of linear equations, Cramer's rule, Gaussian elimination;

B) First order differential equations: separable equations, homogeneous equations, linear equations;

C) Second order linear differential equations with constant coefficients: complementary functions, particular solutions, method of undetermined coefficients;

D) Laplace transforms; Fourier series.

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.	*Calculus – Early Transcendentals* (7th Ed.) by C. Henry Edwards & David E. Penny
2.	*Linear Algebra – A Pure and Applied First Course* (1st Ed.) by Edgar G. Goodaire
3.	*Differential Equations and Boundary Value Problems* (4th Ed.) by C. Henry Edwards & David E. Penny
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2.2 Additional Readings

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

1.	
2.	
3.	
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