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:	**Differential Equations**
Course Code:	**MA3001**
Course Duration:	**1 semester**
Credit Units:	**3 CUs**
Level:	**B3**
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)*	**MA2001 Multi-variable Calculus and Linear Algebra** **MA2149 Mathematical Analysis** **MA2170 Linear Algebra and Multi-variable Calculus OR Equivalent**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**MA3150 Advanced Mathematical Analysis** **MA3151 Advanced Engineering Mathematics**

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims to investigate both the occurrence of differential equations in science and engineering, and the methods available for their solutions. It is intended for students to learn methods and techniques of ordinary and partial differential equations. It will help students develop skills and the ability to think quantitatively and analyse problems critically.

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 at high-level concepts from differential equations and transforms.		✓	✓	
2.	implement basic operations in Fourier series and Laplace transforms.		✓	✓	
3.	solve first and second order ordinary differential equations and systems of linear differential equations.			✓	
4.	solve linear partial differential equations: diffusion, wave and Laplace equations.			✓	
5.	develop advanced mathematical models through differential equations, and appropriately apply advanced mathematical and computational methods to a range of problems in engineering involving differential equations.			✓	✓
	** If weighting is assigned to CILOs, they should add up to 100%.*	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.	Y	Y	Y	Y	Y		39 hours in total
Tutorials	Learning through **tutorials** is primarily based on interactive		Y					3 hours
				Y				5 hours
					Y			3 hour

	problem solving allowing instant feedback.	Y				Y		2 hours
Take-home assignments	Learning through **take-home assignments** helps students understand basic concepts and techniques of differential equations, transforms and some applications in engineering.	Y	Y	Y	Y	Y		after-class
Online applications	Learning through **online examples for applications** helps students apply mathematical and computational methods to some problems in engineering applications.					Y		after-class

4. Assessment Tasks/Activities (ATs)

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

30% Coursework

70% 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: __30__%								
Test		Y	Y	Y			15-30%	Questions are designed for the first part of the course to see how well the students have learned concepts and techniques of differential equations.
Hand-in assignments	Y	Y	Y	Y	Y		0-15%	These are skills based assessment to see whether the students are familiar with advanced concepts and techniques of ordinary and partial differential equations, and some applications in

								engineering.
Formative take-home assignments	Y	Y	Y	Y	Y		0%	The assignments provide students' chances to demonstrate their achievements on ordinary and partial differential equations, and their applications in engineering learned in this course.
Examination: _70___% (duration: 2 hrs, if applicable)								Examination	Y
** 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 SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Formative take-home assignments	ABILITY to SOLVE in DETAIL and with ACCURACY the posed QUESTIONS	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.)

Ordinary differential equations (7 weeks): First order differential equations, Second and higher order linear differential equations; Laplace transform; System of linear differential equations.

Partial differential equations (6 weeks): Diffusion, wave and Laplace equations; Initial value problems; Fourier series; Boundary value problems.

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.	Mathematics for Engineering and Science, Department of Mathematics, City University of Hong Kong, Prentice Hall, Pearson Education South Asia, 2008
2.	
3.	
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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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