City University of Hong Kong
Course Syllabus

offered by College/School/Department of _Mathematics
with effect from Semester A 2022 / 23

Part I Course Overview

Course Title:	**Applied Partial Differential Equations**
Course Code:	**MA5601**
Course Duration:	**One Semester**
Credit Units:	**3**
Level:	**P5**
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

This course aims to introduce more advanced topics of partial differential equations with an emphasis on their mathematical theory and applications.

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 clearly mathematical formulation of stationary and time-dependent boundary value problems arising in physical problems.	20%	✓		
2.	describe analytic and structural properties of Green's functions.	20%	✓	✓	
3.	find Green's functions for boundary value problems by various methods including the use of Dirac-delta functions.	20%	✓	✓	
4.	apply Fourier series and integral transform techniques to obtain solutions of appropriate initial/boundary value problems.	20%	✓	✓	
5.	state and derive the one-dimensional Euler-Lagrange equation.	10%	✓	✓	✓
6.	obtain minimizers of functionals on analytic function spaces as solutions of classical partial differential equations.	10%	✓	✓	✓
		100%			

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
Take-home Assignments	Learning through **take-home assignments** helps students implement more advanced theory and functional analytic techniques of partial differential equations, with applications in mathematical physics.	✓	✓	✓	✓	✓	✓	after-class

4. Assessment Tasks/Activities (ATs)

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

40% Coursework

60% Examination (Duration: 3 hours, at the end of the semester)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4	5	6		
Continuous Assessment: 40%								
Test	✓	✓	✓	✓			20-40%	Questions are designed for the first part of the course to see how well students have learned classical results in the theory of stationary and time-dependent boundary value problems as well as integral transform techniques in solving these problems.
Hand-in assignments	✓	✓	✓	✓	✓	✓	0--20%	These are skills based assessment to help students manipulate advanced theory and functional analytic techniques of partial differential equations, and their applications in mathematical physics.
Examination: 60% (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 and understanding based to assess the student's versatility in advanced theory and techniques underlying solutions of partial differential equations.
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Test	Independent problem solving skills on progressive learning based on lecture	High	Significant	Basic	Not even reaching marginal levels
2. Hand-in assignments	Understanding based on both lecture and outsource reference	High	Significant	Basic	Not even reaching marginal levels
3. Examination	Comprehensive problem solving skills on learning materials throughout the semester	High	Significant	Basic	Not even reaching marginal levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	Independent problem solving skills on progressive learning based on lecture	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	Understanding based on both lecture and outsource reference	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	Comprehensive problem solving skills on learning materials throughout the semester	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.)

The fundamental stationary and time-dependent boundary value problems of solid and fluid mechanics. Classical and weak solutions. Green's functions. Solutions by Fourier series and Fourier transforms. Euler-Lagrange equation and minimization of functionals.

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.	W. Strauss, 1992, Partial Differential Equations: An Introduction. John Wiley & Sons.
2.	P.Wilmott & S. Howison & J. Dewynne, 1997, The Mathematics of Financial Derivatives. A Student Introduction. Cambridge University Press.
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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