Course Syllabus

offered by Department of Mathematics
with effect from Semester A 2017/18

Part I Course Overview

Course Title:	Advanced Partial Differential Equations II
Course Code:	MA8007
Course Duration:	One Semester
Credit Units:	3
Level:	R8
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)*	MA8005 Advanced Partial Differential Equations I MA8006 Functional Analysis and Applications
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

(A 150-word description about the course)

This course aims to give research students a solid training in the advanced theory of linear and nonlinear partial differential equations, such as variational and nonvariational techniques, weak solutions, etc..

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.	Complements of linear and nonlinear functional analysis needed for this course	20%	✓	✓	✓
2.	Describe at high level mathematical theory underlying some linear and nonlinear partial differential equations arising in solid and fluid mechanics	20%	✓	✓	
3.	Explain clearly fundamental concepts of variational techniques based on linear and nonlinear functional analysis	20%	✓	✓	✓
4.	Demonstrate various techniques for nonlinear partial differential equations that are not necessarily of variational form	20%	✓	✓	✓
5.	Construct approximate solutions of nonlinear partial differential equations and study their convergence	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	✓	✓	✓	✓	✓	3 hours/week
Assignments	Learning through take-home assignments helps students implement mathematical principles to understand the theory of partial differential equations.	✓	✓	✓	✓	✓	After class

4. Assessment Tasks/Activities (ATs)

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

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: 30%							
Test	✓	✓	✓			0-35%	Questions are designed for the first part of the course to see how well students have learned mathematical formulation of partial differential equations in mathematical physics.
Hand-in assignments	✓	✓	✓	✓	✓	35-70%	These are skills based assessment to help students implement various methods in problems arising from mathematical physics.
Examination: (duration: 3 hours)	✓	✓	✓	✓	✓	30%	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 finding solutions of partial differential equations.
** 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	DEMONSTRATION of the understanding of the first part of the course	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	DEMONSTRATION of the understanding of the basic materials	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	DEMONSTRATION of skills and versatility in finding solutions of partial differential equations using different methods	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.)

Variational techniques: Korn's inequality, inf-sup theorem, existence of minimizers; nonvariational techniques: monotonicity methods, fixed point methods, Brouwer's fixed point theorem.

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.	P.G. Ciarlet, Linear and Nonlinear Functional Analysis with Applications, SIAM, 2013.
2.	
3.	
…	