Course Syllabus

offered by Department of Mathematics
with effect from Semester A 2022/23

Part I Course Overview

Course Title:	Selected Topics in PDEs
Course Code:	MA8020
Course Duration:	One semester
Credit Units:	3
Level:	R8
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 provide an introduction to mathematical theories of PDE models from fluid mechanics ranging from elementary introductory material to current research topics. Some topics in both incompressible and compressible models will be covered. This course will help students have a direct view of systematic understanding of research difficulties, tools, and frontiers.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Explain the fundamental background and property of models from fluid mechanics.	30%	✓	✓	✓
2.	Explore a systematic understanding of the classical analytic techniques for PDEs from fluid mechanics.	40%	✓	✓	
3.	Knowledge of the current research techniques and difficulties for PDEs from fluid mechanics	20%	✓	✓	
4	Knowledge of literature search	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)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lectures	Learning through teaching is primarily based on lectures	✓	✓	✓	✓			3 hrs/wk
Presentation	Learning through course presentations helps students explore state-of-the-art research frontiers in PDEs from fluid mechanics	✓	✓	✓	✓			3 hrs/wk for 2 weeks

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4				
Continuous Assessment: 60%								
Course presentation	✓	✓	✓	✓			60%	
Examination: 40% (duration: 2 hours)	✓	✓	✓				40%	
							100%	

5. Assessment 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. Course presentation	Demonstration of the understanding of the modern research	High	Significant	Basic	Not even reaching marginal levels
2. Examination	Demonstration of skills and versatility in PDEs from fluid mechanics	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. Course presentation	Demonstration of the understanding of the modern research	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Examination	Demonstration of skills and versatility in PDEs from fluid mechanics	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

Vorticity, Energy Method, Galerkin Method, Particle-Trajectory Method, Leray Weak Solution, Regularity.

2. Reading List

2.1 Compulsory Readings

A. Majda, A. Bertozzi: Vorticity and incompressible flow. Cambridge Texts in Applied Mathematics, 27. Cambridge University Press, Cambridge, 2002.

2.2 Additional Readings