

Course number		U-LAS10 10025 LE55					
Course title (and course title in English)	Mathematical Description of Natural Phenomena-E2			Instructor's name, job title, and department of affiliation	Graduate School of Engineering Senior Lecturer, ISLAM, A K M Mahfuzul		
	Mathematical Description of Natural Phenomena-E2						
Group	Natural Sciences			Field(Classification)	Mathematics(Foundations)		
Language of instruction	English			Old group	Group B		Number of credits 2
Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)		Year/semesters	2024 • First semester	
Days and periods	Tue.2		Target year	Mainly 1st year students		Eligible students	For science students
[Overview and purpose of the course]							
<p>Mathematics is a powerful tool to understand the nature. Generally, only problem-solving techniques are taught till high school. However, the beauty of mathematics lies in creating abstractions. Abstraction is creating new names for some values, processes or understandings. We understand a particular phenomenon first and then we name that phenomenon so that we can use that name in further calculation to help our understanding. For example, we have named π as a particular value that requires some explanation. But, when we use π in calculations we do not break down that concept every time. This course aims at developing a solid understanding of several mathematical concepts. Through this course, students will learn how various physical phenomena such as vibration of a structure, wave propagation, fluid dynamics and so on - can be described in differential equations. They will also learn how to solve those physical problems using different techniques.</p>							
[Course objectives]							
<ul style="list-style-type: none"> - To understand the relationship between scientific observation and mathematics - To learn why and how most physical phenomena can be expressed using differential equations - To learn how to formulate differential equations from physical problems - To learn how to solve the differential equations 							
[Course schedule and contents)]							
1. Introduction [2 weeks] <ul style="list-style-type: none"> a) Types of natural phenomena b) Different types of problems and relationship with differential equations 2. Basics of Calculus [6 weeks] <ul style="list-style-type: none"> a) Review of calculus: derivatives, basic rules, chain rule, implicit differentiation, inverse functions, and their derivatives, etc. b) Exponential and logarithmic functions, their derivatives, characterizations of exponential functions, etc. 3. Complex number [2 weeks] 4. Differential equations and partial differential equations [2 weeks] 5. Modeling of natural phenomena using differential equations [2 weeks] 6. Examinations [1 week] 7. Feedback [1 week]							
<div style="text-align: right;">Continue to Mathematical Description of Natural Phenomena-E2(2)</div>							

Mathematical Description of Natural Phenomena-E2(2)

[Course requirements]

None

[Evaluation methods and policy]

Quizzes and exercises (50%) and final examination (50%)

[Textbooks]

Instructed during class

[References, etc.]

(**References, etc.**)

Introduced during class

[Study outside of class (preparation and review)]

Preparation and review are required. Handouts will be provided beforehand. Sample programs (Matlab or Python) will also be provided to deepen the understanding and grow a feeling of several mathematical concepts. Students are encouraged to run the programs, visualize how differential equations evolve.

[Other information (office hours, etc.)]

Office hour after class.