科目ナンバリング U-LAS1				LAS10 10	AS10 10014 LE55												
授業科目		Mathematical Description of Natural Phenomena Mathematical Description of Natural Phenomena							担当者所属 職名・氏名		工学研究科			准教授 CHANG, Kai-Chun			
群	自然科学科目群			,	分野(分類)	数学	学(基礎)				使用言語			用言語	英語		
旧群	日群 B群		単位数	2単位	週コマ数		1 🗆	コマ		授第	受業形態 講		講拿	義(対面授業科目)			
開講年度・ 開講期	20)25 •	前期	曜時限	火:	3			配当	当学年	Ē Ē	Eとして	[10]	生	対象学:	生	理系向
「授業の	[授業の概要・目的]																

This course aims at bridging the gap between high school mathematics and college mathematics and enhancing students ' understanding of the mathematical concepts essential for advanced courses in the Undergraduate School of Engineering. The course explores how physical phenomena in engineering - such as radioactive decay, the motion of a sprung mass, and the vibrations of a structure - are described mathematically, primarily through differential equations. Also, it covers methods for solving and interpreting these differential equations, while revisiting fundamental topics from Calculus and Linear Algebra that support these tasks.

[到達目標]

- To understand the relationship between scientific observation and mathematics.
- To understand how physical phenomena in engineering disciplines are described using differential equations, and how to solve and interpret these equations.

[授業計画と内容]

- * The lecture is designed to cover the following topics.
- 1. Introduction
- Describing phenomena, input-output system model, etc. [2 weeks]
- 2. Basics of Calculus
- Picture of Calculus, derivatives, basic rules, chain rule, implicit differentiation, inverse functions and their derivatives, etc. [4 weeks]
- Exponential and logarithmic functions, their derivatives, characterizations of exponential functions, etc. [2 weeksl
- 3. Differential equations and phenomenon descriptions
- Radioactive decay, population growth/decay, mixed growth/decay [3 weeks]
- Spring problems, equations of motion, simple harmonic motions, damped vibrations, etc. [3 weeks]
- 4. Feedback [1 week]

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特になし

Mathematical Description of Natural Phenomena(2)
[成績評価の方法・観点]
Quizzes and exercises (50%) and final examination (50%)
[教科書]
Handwriting and handouts distributed in class or uploaded to the PandA course site
[参考書等]
(参考書) G. Strang 『Calculus, 2nd ed.』(Wellesley-Cambridge Press) W.F. Trench 『Elementary Differential Equations』(Brooks/Cole)
[授業外学修(予習・復習)等]
Students are expected to dedicate at least 2 hours to preview and review. More than half of this time is spent preparing for class and completing assignments.
[その他(オフィスアワー等)]
Any inquiry to the instructor: chang.kaichun.4z{at}kyoto-u.ac.jp. (replace {at} with @)
[主要授業科目(学部・学科名)]