科目ナンバリング	U-LAS10 10014 LE55				
授業科目名<英訳>	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(基礎)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ
授業形態	講義（対面授業科目）				
開講年度・開講期	2026・前期	曜時限	火3	配当学年	主として1回生
対象学生	理系向				

[授業の概要・目的]

This course is designed to bridge the gap between high school mathematics and college mathematics and to strengthen the foundational understanding necessary for advanced courses in the Undergraduate School of Engineering. The course explores how physical engineering phenomena - 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 required for these tasks.

[到達目標]

・To understand the fundamental relationship between scientific observation, physical phenomena, and their mathematical description
・To model physical phenomena in engineering disciplines using differential equations, and master the methods required to both 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. [3 weeks]
 - Exponential and logarithmic functions, their derivatives, characterizations of exponential functions, etc. [2 weeks]

3. Differential equations and phenomenon descriptions
 - Radioactive decay, population growth/decay, mixed growth/decay [4 weeks]
 - Spring problems, equations of motion, simple harmonic motions, damped vibrations, etc. [3 weeks]

4. Feedback [1 week]

[履修要件]

特になし

Mathematical Description of Natural Phenomena(2)へ続く↓↓↓

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 LMS 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 two hours or more per week to course material, primarily for previewing content and reviewing lectures. More than half of this time should be focused on 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）]