| 科目ナンバリング | U-LAS10 20004 LE55 | | | | |
|---|---|---|---|---|---|
| 授業科目名<英訳> | Advanced Calculus II-Differential Equations<br>Advanced Calculus II-Differential Equations | 担当者所属職名・氏名 | 工学研究科　准教授　QURESHI, Ali Gul | | |
| 群 | 自然科学科目群 | 分野(分類) | 数学(発展) | 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・後期 | 曜時限 | 水5 | 配当学年 | ２回生以上 | 対象学生 | 理系向 |

**[授業の概要・目的]**

Based on the knowledge of Calculus with Exercises A/B and Linear Algebra with Exercises A/B or Calculus A/ B and Linear Algebra A/B, this course explains ordinary differential equations. Starting from the basic solutions techniques (such as separation of variables and integrating factors) for differential equations, the course introduces the second order linear differential equations and their solution. Differential equations are studied in context of modelling of various physical situations (for example, vibrations, mixing problem, population dynamics, etc.).

**[到達目標]**

To learn the different types of differential equations and their solution methods.

**[授業計画と内容]**

1. Elementary methods of solution (6 weeks)
- Separation of variables, linear first order differential equations, total differential equations (exact differential equations) and integrating factors
2. Existence and uniqueness of the solution of initial value problems (4 weeks)
- Space of continuous functions and its properties (normed spaces, completeness), iterated approximation, Cauchy-Lipschitz's theorem and the connection of solution
3. Linear differential equations (4 weeks)
- Space of solutions of homogeneous equations, variation of parameters, exponential function for matrices and Wronskian determinant.
4. Feedback (1 week)

**[履修要件]**

To understand Calculus with Exercises A/B and Linear Algebra with Exercises A/B or Calculus A/B and Linear Algebra A/B.

**[成績評価の方法・観点]**

Weekly submission of class examples, class participation and homework (20%), Snap quizzes (15%), Final examination(65%).

**[教科書]**

Erwin Kreyszig 『Advanced Engineering Mathematics, 9th ed.』 （Wiley, 2006）

**[参考書等]**

**（参考書）**

Joel R. Hass, Christopher E. Heil and Maurice D. Weir 『Thomas' Calculus, 14th ed.』 （Pearson）
Gilbert Strang et al. 『Calculus Vol. 2 and Vol. 3』 （OpenStax） （Books are available online at https://openstax.org/details/books/calculus-volume-2 and https://openstax.org/details/books/calculus-volume-3）

Advanced Calculus II-Differential Equations(2)へ続く↓↓↓

**Advanced Calculus II-Differential Equations(2)**

Richard Bronson and Gabriel Costa 『Differential Equations, 4th ed.』 （McGraw-Hill）

**[授業外学修（予習・復習）等]**

Students are encouraged to do assigned homework related to the classes.

**[その他（オフィスアワー等）]**

The content of this course is independent of Advanced Calculus I in the 1st semester.

**[主要授業科目（学部・学科名）]**

**理学部**