Applied Mathematics

KAMIDE, Norihiro

1. Course Description

The contents of the lectures are summarized as follows: (1) foundations of differential equations, (2) Laplace transform (Laplace transform and inverse Laplace transform), (3) applications of Laplace transform for solving differential equations and (4) Fourier analysis (Fourier series, Fourier transform, inverse Fourier transform and their applications to solving differential equations).

2. Course Objectives

The aim of this course is to understand the following items: (1) basic concepts of differential equations, (2) how to use Laplace transform for solving differential equations and (3) how to use Fourier transform and Fourier series for solving differential equations.

3. Grading Policy

Students are evaluated by a term examination, some midterm examinations, and some quizzes.

4. Textbook and Reference

Textbook
No textbook. The original slides and video contents are used.
Reference
No reference. The original slides and video contents are used.

5. Requirements(Assignments)

The slides of the lecture should be read. The video contents of the lecture should be viewed.

6. Note

LMS is used in this course.

7. Schedule

[1]	Foundations of differential equations (1): Basic definitions and backgrounds.
[2]	Foundations of differential equations (2): Separation of variables. First-order differential equations.
[3]	Foundations of differential equations (3): Linear differential equations.
[4]	Foundations of differential equations (4): Symbolic method for solving linear differential equations.
[5]	Foundations of differential equations (5): Picard iteration. Power series solution.
[6]	Laplace transform (1): Outline and background. Midterm examination 1.
[7]	Laplace transform (2): Improper integral. Infinite integral. Special functions.
[8]	Laplace transform (3): Properties of Laplace transform.
[9]	Laplace transform (4): Properties of inverse Laplace transform.
[10]	Laplace transform (5): Applications to solve differential equations.
[11]	Fourier analysis (1): Backgrounds of Fourier transform and Fourier series. Midterm examination 2.
[12]	Fourier analysis (2): Periodic function. Fourier series expansion.
[13]	Fourier analysis (3): Fourier transform. Inverse Fourier transform.
[14]	Fourier analysis (4): Applications of Fourier transform to solve differential equations.
[15]	Fourier analysis (5): Applications of Fourier series to solve differential equations. Term examination.