

Syllabus 2017 Computer and Mathematical Sciences Theory of Differential Equations

Japanese

Basic information

held this year:	yes
instructor(s)	Prof. Kazuyuki Tanaka
room	Middle Lecture Room, Second Floor of the Building of Graduate School of Information Sciences
schedule	The first half year (Wednesday) 10:30–12:00
begins on:	04/12

Objectives and outline

1. The differential equations play a very important role in physics and engineering. In this lecture, sutudents study some ordinary differential equations of a complex variable, some partial differential equations and the method of Green's function on the basis of the contents studied in the undergraduate course for the differential equations.
2. The main topics are as follows : integral representations of solutions for second order ordinary differential equations of a complex variable, partial differential equations, heat equations, Laplace's equation, Poisson's equation, the eigenvalue problem of partial differential equations and related Green's function method and so on.
3. Students study those topics by keeping application to engineering in mind, along with their fundamental concepts.

Class plan

- 1st Linear ordinary differential equations of second order and solutions in power series I
- 2st Linear ordinary differential equations of second order and solutions in power series II
- 3nd Legendre's equation and solutions in power series
- 4rd Bessel's equation and solutions in power series
- 5th Hypergeometric and confluent hypergeometric equations
- 6st Integral representation of solutions of linear ordinary differential equations of second order
- 7th Integral representation of solutions of Legendre's equation
- 8th Integral representation of solutions of Bessel's equation
- 9th Integral representation of solutions of hypergeometric equation
- 10th Integral representation of solutions of confluent hypergeometric equation
- 11th Fundamental properties of Green's function
- 12th Green's function of Laplace equations and Poisson's equations
- 13th Green's function of Helmholtz equations
- 14th Green's function of Sturm–Liouville equations
- 15th Summary and Examination

Evaluation

Evaluation is performed comprehensively based on final examinations (80%) and submitted reports(20%).

Textbook(s)

- 1) E. T. Whittaker and G. N. Watson: A Course of Modern Analysis, Cambridge University Press.
- 2) R. Courant and D. Hilbert: Methods of Mathematical Physics (Wiley Classics Library), John Wiley & Sons.

Web site

<http://www.smapip.is.tohoku.ac.jp/~kazu/ODE/2017/>

Office hours

Students should visit the office after taking an appointment by e-mail (kazu [at mark] smapip.is.tohoku.ac.jp).

■ Other information

Differential and integral calculus, complex analysis and Fourier analysis are necessary as background knowledge. This lecture is presented in Japanese.

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