

Applied Mathematics II

Laplace Transform and Fourier Analysis

Course Information

School year: 4th, Required for all departments (except for the department of chemistry and materials science)
Semester/Term: Full year (April - August, October - February)
Schedule: 90 minutes, once a week (total 30 lectures)
Credit hours: 2
Prerequisites: Mathematics AI, Mathematics AII, Mathematics B

Course Description

Definition and basic properties of Laplace transform; inverse Laplace transform; convolution of Laplace transform; Fourier series; convergence theorem of Fourier series; complex Fourier series; Definition and basic properties of Fourier transform, Fourier's integral theorem; inversion formula; convolution of Fourier transform

Instructors

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Course Outcomes

Upon completion of this course/program a student will be able to:

1. Understand basic properties of Laplace transform such as linearity, scaling, translation, differentiation, integration and convolution.
2. Evaluate Laplace transform of simple functions.
3. Find inverse Laplace transform of simple functions.
4. Solve differential equations with Laplace and inverse Laplace transform.
5. Expand periodic functions into real and complex Fourier series.
6. Use convergence theorem of Fourier series to evaluate sum of infinite series.
7. Solve partial differential equations using the method of separation of variables and techniques of Fourier series.
8. Understand basic properties of Fourier transform such as linearity, scaling, translation, differentiation and convolution.
9. Use Fourier's integral theorem to evaluate integral of some functions.
10. Solve partial differential equations using Fourier transform and inversion formula.
11. Understand basic properties of Dirac's delta function and optimize it.

Textbook

Applied Mathematics (Second Edition)
by H. Usui, H. Saitoh, Y. Sato, K. Sukou, S. Takato and S. Yamashita
Dainippon tosho, Tokyo, 2005.
pp.52-110 (in Japanese)
http://www.dainippon-toshco.jp/textbook/hs_uc/university_06.html

Grade Distribution

First Midterm Exam: 20%
Second Midterm Exam: 20%
Third Midterm Exam: 20%
Final Exam: 20%
Assignments, Quizzes: 20%

Grading Policy and Criteria

Final grades will be a percentage of points earned versus points possible.

80 - 100%	A
70 - 79%	B
60 - 69%	C
Below 60%	D (disqualified)

Questions

Please contact one of the instructors listed above if you have questions or suggestions concerning the syllabus.