

MATH 513
Mathematical Methods for Engineers

Instructor: Dr. Boubaker Smii

BOOK: Advanced Engineering Mathematics with Matlab, Dean G. Duffy, 3rd Ed, 2010.

Course Description:

Laplace transforms including the convolution theorem, error and gamma functions. The method of Frobenius for series solutions to differential equations. Fourier series, Fourier-Bessel series and boundary value problems, Sturm-Liouville theory. Partial differential equations: separation of variable and Laplace transform and Fourier integrals methods. The heat equation. Laplace equation, and wave equation. Eigenvalue problems for matrices, diagonalization.

Objectives: This course is designed to introduce basic methods in Linear Algebra and Partial Differential Equations to students of engineering and science.

Learning outcomes:

- 1- Obtain Fourier series representations of commonly used functions.
- 2-Solve Sturm Liouvilles Problems.
- 3-Know basic properties of Laplace and Fourier Transforms and be able to find transforms of commonly used functions.
- 4- Know basic linear partial differential equations (PDEs).
- 5-Solve these PDEs using Fourier Series, Laplace, and Fourier Transforms.
- 6-Understand and apply basic linear algebra

Syllabus:

Week	Date	Chapter	Topic
1	Sep.17-21	4	Fourier Series
2	Sep.24-28		
3	Oct.1-5	5	The Fourier Transform
4	Oct.7-12		
5	Oct. 15-19	6	The Laplace Transform
6	Oct.22-26		
7	Oct.29-Nov. 2 nd	9	The Sturm-Liouville Problem
8	Nov.5-9		
9	Nov.12-16	10	The Wave Equation
10	Nov.19-23		
11	Nov.26-30	11	The Heat Equation
12	Dec.3-7	12	The Laplace Equation
13	Dec.10-14	15	Linear Algebra
14	Dec.17-21		
15	Dec.24-28	----	Review

