

MA 3353, Differential Equations II

2006-2007 Bulletin Data: MA 3353 Differential Equations II. (3) (Prerequisite: MA 3253). Three hours lecture. Systems of differential equations; matrix representations; infinite series solution of ordinary differential equations; selected special functions; boundary-valued problems; orthogonal functions: Fourier series.

Textbook: Differential Equations, with Boundary Value Problems, 6<sup>th</sup> edition, Zill Cullen, Brooks/Cole

Prerequisite: MA 3253 Differential Equations I.

Objectives:

1. Students will be able to find series solutions around ordinary points and regular singular points.
2. Students will become familiar with some standard special functions.
3. Students will learn how to decompose functions into Fourier series.
4. Students will learn the derivations of and classical solutions techniques to the standard partial differential equations.

Topics Covered:

1. Series Solutions of Linear Equations (10 hours)  
Including
  - Review of Power Series
  - Solutions about Ordinary Points
  - Solutions about Singular Points
  - Bessel Equations
  - Legendre Equations
2. Orthogonal Functions and Fourier Series ( 10 hours)  
Including
  - Orthogonal Functions
  - Fourier Series
  - Cosine and Sine Series
  - Sturm-Liouville Problems
3. Partial Differential Equations and Boundary -Value Problems (12 hours)  
Including
  - Separable Partial Differential Equations
  - Classical Solutions and Boundary-Valued Problems

Heat Equations  
Wave Equations  
Laplace Equations  
Nonhomogeneous Equations and Boundary Conditions

4. Integral Transform Method (8 hours)

Including

Applications of Laplace Transformations  
Fourier Integrals  
Fourier Transforms