Math 204

MATH 204 Differential Equations

Various types of first order equations and their applications. Linear equations of higher order. Systems of linear equations with constant coefficients, reduction of order. Power series methods for solving second order equations with polynomial coefficients. Fourier series, Fourier series for even and odd functions. Complex Fourier series. The Fourier integral.

TEXT BOOK: Differential equations with boundary value problems

Authors: Dennis G. Zill and Michael R Cullen (Sixth edition)

Additional Reference: Differential Equations by Said Mesloub, Mostafa Damlakhi and Khawaja Zafar Elahi.

Week Course Details

1. Definition of a Diff Eq , Classification of Diff Eq by (type, order, linearity) ,

Interval of definition, Solutions (explicit, implicit). (Chapter 1).

2. Initial value problems. Existence and uniqueness theorem, Separable

equations (Separable variable). (Chap 1+Chap 2).

3. Linear equations, Exact Equations, Integrating factor. (Chap 2).

4. Solutions by substitution: Homogeneous equations. (Chap 2).

5. Bernoulli equation, Equations with linear coefficients. (Chap 2).

6. Linear Models: Growth and decay, Newton's Law of Cooling/ Warming. (Chap 3).

7. H.O.D.E. Linear Diff Eqs: Existence-Uniqueness theorem, Linearly

(independent, dependent), Wronskian. Reduction of order . (Chap 4).

8. Hom-Lin-Eq with constant coeffs. Undetermined coefficient method,

Superposition principle. (Chap 4).

9. Variation of parameters, Cauchy-Euler Equation. (Chap 4).

10. Solving systems of Linear Equations by Elimination. (Chap 4).

11. Series solutions of Linear Equations. (Chap 6).

12. Orthogonal Functions and Fourier Series. (Chap 11).

13. Fourier cosine and sine series, Complex Fourier Series. (Chap 11).

14. Fourier Integral. (Chap 14).

15. Revision.