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**Math 255 : Differential Equations ( ~ 30 lectures + 20 recitations )**

Text: Elementary Differential Equations and Boundary Value Problems, 7th OSU Custom Edition

**Introduction ( ~ 2 lectures )**

1.1 Some Basic Mathematical Models; Direction Fields
1.3 Classification of Differential Equations
1.2 Solutions of Some Differential Equations
2.2 Separable Equations

**First Order Differential Equations ( ~ 6 lectures )**

2.1 Linear Equations with Variable Coefficients
2.4 Differences Between Linear and Nonlinear Equations
2.5 Autonomous Equations and Population Dynamics
2.6 Exact Equations and Integrating Factors
2.7 Numerical Approximations: Euler’s Method
2.8 The Existence and Uniqueness Theorem

**Second Order Linear Equations ( ~ 5 lectures )**

3.1 Homogeneous Equations with Constant Coefficients
3.4 Complex Roots of the Characteristic Equation
3.2 Fundamental Solutions of Linear Homogeneous Equations
3.3 Linear Independence and the Wronskian
3.5 Repeated Roots; Reduction of Order
3.6 Nonhomogeneous Equations; Method of Undetermined Coefficients
3.7 Variation of Parameters

**MIDTERM #1**

**Higher Order Linear Equations ( ~ 6 lectures)**

4.1 General Theory of nth Order Equations
4.2 Homogeneous Equations with Constant Coefficients
4.3 The Method of Undetermined Coefficients
4.4 The Method of Variation of Parameters

**Series Solutions of Second Order Linear Equations ( ~ 6 lectures)**

5.1 Review of Power Series
5.2 Series Solutions near an Ordinary Point, Part I
5.3 Regular Singular Points
5.4 Euler Equations
5.5 Series Solutions near a Regular Singular Point, Part I
5.6 Series Solutions near a Regular Singular Point, Part II

**MIDTERM # 2**

**The Laplace Transform ( ~ 5 lectures)**

6.1 Definition of the Laplace Transform
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