

MATH 2260 (Ordinary Differential Equations I) — Spring 2019

Course Outline

UNIT 1: FIRST ORDER DIFFERENTIAL EQUATIONS (approx. 5 weeks)

- 1.1: Classification of Differential Equations (§1.3)
- 1.2: Simple Differential Equations and Direction Fields (§1.1, 1.2)
- 1.3: Method of Integrating Factors (§2.1)
- 1.4: Solving Nonlinear Equations by Linear Methods (§2.2)
- 1.5: Exact Equations and Integrating Factors (§2.6)
- 1.6: Differences Between Linear and Nonlinear Equations (§2.4)
- 1.7: Modelling with First Order Equations (§2.3)
- 1.8: Autonomous Equations and Population Dynamics (§2.5)

UNIT 2: HIGHER-ORDER HOMOGENEOUS LINEAR EQUATIONS (approx. 3 weeks)

- 2.1: Second Order Equations with Constant Coefficients (§3.1)
- 2.2: Solutions of Second Order Equations (§3.2)
- 2.3: Complex Roots of the Characteristic Equation (§3.3)
- 2.4: Repeated Roots; Reduction of Order (§3.4)
- 2.5: General Theory of n th Order Linear Equations (§4.1)
- 2.6: n th Order Homogeneous Equations with Constant Coefficients (§4.2)

UNIT 3: HIGHER-ORDER NONHOMOGENEOUS LINEAR EQUATIONS (approx. 2 weeks)

- 3.1: Method of Undetermined Coefficients (§3.5, 4.3)
- 3.2: Variation of Parameters (§3.6, 4.4)
- 3.3: Mechanical Vibrations (§3.7, 3.8)

UNIT 4: THE LAPLACE TRANSFORM (approx. 2 weeks)

- 4.1: Definition of the Laplace Transform (§6.1)
- 4.2: Solution of Initial Value Problems (§6.2)
- 4.3: Step Functions (§6.3)
- 4.4: Differential Equations with Discontinuous Forcing Functions (§6.4)
- 4.5: Impulse Functions (Section 6.5[†])
- 4.6: The Convolution Integral (Section 6.6[†])

Section numbers (§) refer to Boyce & DiPrima, 11th edition.

[†] These sections will be covered only as time permits.