

MATH 2260 (Ordinary Differential Equations I) — Fall 2014

Course Outline

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

- 1.1: Introduction, First-Order Equations, Direction Fields (§1.1–1.3)
- 1.2: Integrating Factors and Variation of Parameters (§2.1)
- 1.3: Nonlinear Equations (§2.2–2.4)
- 1.4: Exact Equations and Integrating Factors (§2.5, 2.6)
- 1.5: Modelling with First-Order Equations (§4.1, 4.2)
- 1.6: Autonomous Equations and Population Dynamics

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

- 2.1: Homogeneous Second-Order Equations (§5.1)
- 2.2: Second-Order Equations with Constant Coefficients (§5.2)
- 2.3: Reduction of Order (§5.6)
- 2.4: n th Order Linear Equations (§9.1, 9.2)

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

- 3.1: Method of Undetermined Coefficients (§5.4, 5.5, 9.3)
- 3.2: Variation of Parameters (§5.7, 9.4)
- 3.3: Mechanical Vibrations (§6.1, 6.2)

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

- 4.1: Definition of the Laplace Transform (§8.1)
- 4.2: Solution of Initial Value Problems (§8.2, 8.3)
- 4.3: Step Functions and Discontinuous Forcing (§8.4, 8.5)
- 4.4: The Convolution Integral (Section 8.6)
- 4.5: Impulse Functions (Section 8.7)

Section numbers (§) refer to Trench.