

MA 213 Course Outline

1. Vectors and Geometry in \mathbb{R}^2 and \mathbb{R}^3

- (a) Three-Dimensional Coordinate System
- (b) Vectors
- (c) The Dot and Cross Products
- (d) Equations of Lines and Planes
- (e) Surfaces in \mathbb{R}^3

2. Parametric Equations

- (a) Curves Defined by Parametric Equations
- (b) Tangents and Area
- (c) Arc Length

3. Vector-Valued Functions

- (a) Vector Functions and Space Curves
- (b) Derivatives and Integrals of Vector Functions
- (c) Arc Length and Curvature
- (d) Velocity and Acceleration

4. Partial Derivatives

- (a) Functions of Several Variables
- (b) Limits and Continuity
- (c) Partial Derivatives
- (d) Tangent Planes and the Total Differential
- (e) The Chain Rules
- (f) Directional Derivatives and ∇
- (g) Extrema
- (h) Lagrange Multipliers

5. Multiple Integration

- (a) Double Integrals over Rectangles
- (b) Iterated Integrals
- (c) Introduction to Polar Coordinates
- (d) Double Integrals in Polar Coordinates
- (e) Applications of Double Integrals
- (f) Triple Integrals
- (g) Introduction to Cylindrical and Spherical Coordinates
- (h) Triple Integrals in Cylindrical and Spherical Coordinates

6. Vector Calculus

- (a) Vector Fields
- (b) Line Integrals and the Fundamental Theorem
- (c) Green's Theorem