

# Syllabus for Mathematics 10A

Textbook: 5<sup>th</sup> Edition of [Vector Calculus](#) by Jerrold [Marsden](#) and Anthony [Tromba](#)

## The Geometry of Euclidean Space [5 lectures]

- 1.1 Vectors in Two- and Three-Dimensional Space
- 1.2 The Inner Product, Length and Distance
- 1.3 Matrices, Determinants and Cross-Products
- 1.4 Cylindrical and Spherical Coordinates
- 1.5 n-Dimensional Euclidean Space

## Differentiation [7 lectures]

- 2.1 The Geometry of Real-Valued Functions
- 2.2 Limits and Continuity
- 2.3 Differentiation
- 2.4 Introduction to paths and Curves
- 2.5 Properties of the Derivative
- 2.6 Gradients and Directional Derivatives

## Higher derivatives; Maxim and Minima [9 lectures]

- 3.1 Iterated Partial Derivatives
- 3.2 Taylor's Theorem
- 3.3 Extrema of Real-Valued Functions
- 3.4 Constrained Extrema and Lagrange Multipliers
- 3.5 The Implicit Function Theorem

## Vector valued functions [6 lectures]

- 4.1 Acceleration and Newton's Second Law
- 4.2 Arc Length
- 4.3 Vector Fields
- 4.4 Divergence and Curl