

# Syllabus for Mathematics 10B

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

## Double and Triple Integrals [9 lectures]

- 5.1 Introduction
- 5.2 The Double Integral Over a Rectangle
- 5.3 The Double Integral Over More General Regions
- 5.4 Changing the Order of Integration
- 5.5 The Triple Integral

## Change of Variables and Applications of Integration [3 lectures]

- 6.1 The Geometry of Maps from  $\mathbf{R}^2$  to  $\mathbf{R}^2$ .
- 6.2 The Change of Variable Theorem
- 6.3 Applications
- 6.4 Improper integrals

## Integrals over paths and Surfaces [6 lectures]

- 7.1 The path Integral
- 7.2 Line Integrals
- 7.3 Parameterized Surfaces
- 7.4 Area of a Surface
- 7.5 Integrals of Scalar Functions Over Surfaces
- 7.6 Surface Integrals of Vector Fields
- 7.7 Applications

## Integral Theorems of Vector Analysis [9 lectures]

- 8.1 Green's Theorem
- 8.2 Stokes' Theorem
- 8.3 Conservative Fields
- 8.4 Gauss' Theorem
- 8.5 Differential Equations of Mechanics and Technology
- 8.6 Differential forms