

**DEPARTMENT OF MATHEMATICS AND STATISTICS**  
**UNIVERSITY OF MASSACHUSETTS AMHERST**  
**MATH 233 Spring 2020 (4 credits, GenEd R2)**  
**Sections Covered**

**Chapter 12. Vectors and the Geometry of Space**

- 12.1 Three-dimensional Coordinate Systems
- 12.2 Vector
- 12.3 The Dot Product
- 12.4 The Cross Product
- 12.5 Equations of Lines and Planes
- 12.6 Cylinders and Quadric surfaces

**Chapter 13. Vector functions**

- 10.1 Parametric equations (review)
- 13.1 Vector Functions and Space Curves
- 13.2 Derivatives and Integrals of Vector Functions
- 13.3 Arc Length
- 13.4 Motion in Space: Velocity and Acceleration

**Chapter 14. Partial derivatives**

- 14.1 Functions of Several Variables
- 14.2 Limits and Continuity
- 14.3 Partial Derivatives
- 14.4 Tangent Planes and Linear Approximations
- 14.5 The Chain Rule
- 14.6 Directional Derivatives and the Gradient Vector
- 14.7 Maximum and Minimum Values
- 14.8 Lagrange Multipliers

**Chapter 15. Multiple integrals**

- 15.1 Double Integrals over Rectangles
- 15.2 Double Integrals over General Regions
- 10.3 Polar Coordinates (review)
- 15.3 Double Integrals in Polar Coordinates
- 15.4 Applications of Double Integrals
- 15.5 Surface Area
- 15.6 Triple Integrals
- 15.7 Triple Integrals in Cylindrical Coordinates
- 15.8 Triple Integrals in Spherical Coordinates
- 15.9 Change of Variables in Multiple Integrals

**Chapter 16. Vector Calculus**

- 16.1 Vector fields
- 16.2 Line integrals
- 16.3 The Fundamental Theorem for Line Integrals
- 16.4 Green's theorem
- 16.5 Curl and Divergence
- 16.6 Parametric Surfaces and Their Areas (time permitting)
- 16.7 Surface Integral
- 16.8 Stokes' Theorem
- 16.9 The Divergence Theorem