UCSB Department of Mathematics
Course Outline
MATH 6A: Vector Calculus with Applications, First Course

The following is a typical outline of MATH 6A at UCSB. Instructors will generally cover the content described here, but the pacing and structure of the course may vary.

The suggested text is the UCSB Math 6A/6B Materials, 13th Edition, prepared by Wiley from Lovric's Text.

Week 1:
• Parametric Curves
• Polar Coordinates
• Tangents in Cartesian and Polar Coordinates

Week 2:
• Applications to Calculus on Parametric and Polar Curves
• Review of Three-Dimensional Coordinate Systems. Vectors, Dot and Cross Product
• Applications of Vectors to Lines and Planes in Space

Week 3:
• Cylinders and Quadric Surfaces
• Vector Functions and Space Curves
• Derivatives and Integrals of Vector Functions

Week 4:
• Arc Length and Curvature
• Normal and Binormal Vectors. Velocity and Acceleration
• Midterm 1

Week 5:
• Functions of Several Variables.
• Limits and Continuity
• Partial Derivatives

Week 6:
• Tangent Planes. Linear Approximations
• The Chain Rule. Differentiability
• Implicit Differentiation. Directional Derivatives and Gradient

Week 7:
• Tangent Lines and Planes to Curves and Surfaces. Extrema of Functions
• Global Extrema. Lagrange Multipliers
• Midterm 2

Week 8:
• Double integrals over Rectangles
• Iterated Integrals
• Double Integrals over General Regions and in Polar Coordinates

Week 9:
• Double Integrals (continued)
• Triple integrals
• Triple integrals

Week 10:
• Change of Variables in Multiple Integrals
• Review
• Review