

COURSE OUTLINE

<u>MAT251</u>	<u>Calculus III</u>	<u>4</u>
Course Number	Course Title	Credits

<u>4/Week</u>	<u>0/Week</u>	<u>0/Week</u>	<u>0/Week</u>	<u>15 Weeks</u>
Class or Lecture	Laboratory Work Hours	Laboratory, Shop, Studio or Clinic	Work Experience	Semester Length

<u>Not Applicable</u>	<u>Not Applicable</u>
Performance on an Examination/Demonstration	Telecourse

Required Materials:

Text: See Division Booklist

A graphing calculator is required. TI calculators will be used by the instructor and is therefore strongly recommended for the student. Consult with your instructor as to the appropriate model.

Catalog Description:

Continuation of MA152. Topics include the following: vectors, planes, and quadratic surfaces in a three-space; vector-valued functions; partial derivatives, multiple integrals and topics in vector calculus.

Latest Review: Spring 2006

Prerequisites: MAT152 with a minimum C grade or appropriate College Level Math placement test score and consultation with mathematics faculty member

Co-requisites: None

Course Coordinator: Arthur E. Schwartz

- I. Three Dimensional Space (3 weeks)
  - A. Rectangular Coordinates in 3-space; Spheres; Cylindrical surfaces.
  - B. Vectors and Lines in 3-space.
  - C. Dot Product; Projection
  - D. Cross Product
  - E. Curves in 3-Space
  - F. Planes in 3-Space
  - G. Cramer's Rule (optional)
  - H. Quadric Surfaces
  - I. Spherical and Cylindrical Coordinates
  
- II. Vector-Values Functions (2 weeks)
  - A. Introduction
  - B. Limits and derivatives of Vector-valued functions.
  - C. Integration of Vector-valued functions; Arc Length
  - D. Unit tangent and normal vectors
  - E. Curvature
  - F. Motion along a curve
  
- III. Partial Derivatives (4 weeks)
  - A. Functions of two variables
  - B. Partial Derivatives
  - C. Limits, Continuity, and Differentiability
  - D. The Chain Rule for Functions of Two Variables
  - E. Directional Derivatives; Gradient
  - F. Tangent Planes
  - G. Functions of Three Variables
  - H. Functions of n Variables; More on the Chain Rule
  - I. Maxima and Minima of Functions of Two Variables
  - J. Lagrange Multipliers
  
- IV. Multiple Integrals (3 weeks)
  - A. Double Integrals
  - B. Double Integrals Over Nonrectangular Regions
  - C. Double Integrals in Polar Coordinates
  - D. Surface Area
  - E. Triple Integrals
  - F. Centroids, Centers of Gravity, Theorem of Pappus
  - G. Triple Integrals in Cylindrical and Spherical Coordinates.

- V. Topics in Vector Calculus (3 weeks)
- A. Line Integrals
  - B. Line Integrals Independent of Path
  - C. Green's Theorem
  - D. Introduction of Surface Integrals
  - E. Surface Integrals of Vector Functions
  - F. The Divergence Theorem
  - G. Stokes' Theorem
  - H. Applications

### Suggested Grading

The instructor could give 4 or 5 tests and a final exam. The final exam weight is in the range of 20%-25% of the final grade.