

Math 2415 Calculus III Course Document

Credit Hours

Four semester hours

Transferability

This course should transfer to all four year colleges and degree programs. If you are concerned about the transferability of this course you should contact the counseling center or the college / university to which you will transfer.

Prerequisites

Math 2414 Calculus 2 or Instructor or Departmental Approval

Course Description

Calculus 3 focuses on the calculus of several variables. It includes an introduction to polar coordinates, solid analytic geometry, partial derivatives and multiple integrals. The course also includes Green's Theorem, Stokes' Theorem, and the Divergence Theorem.

Materials

Required Textbook and Scientific Calculator (Graphing Calculator Recommended)

Learning Outcomes

- Use three space vector operations.
- Acquire a graphic and algebraic understanding of quadratic surfaces.
- Explore selected topics of solid analytic geometry pertaining to lines and planes.
- Use the cylindrical and spherical coordinate systems.
- Analyze and apply the concepts of limits and continuity to multivariable functions.
- Evaluate multiple integrals in both rectangular and alternate coordinate systems.
- Apply the concepts of partial derivatives and multiple integrals to applied problems.
- Evaluate line and surface integrals using, in particular, Green's Theorem, Stoke's Theorem, and the Divergence Theorem.

Textbook Sections

Calculus

James Stewart, 6th Edition

Thomson Brookes Cole

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11.1 Review, Curves and Parametric Equations

11.2 Review, Calculus with Parametric Equations

11.3 Review, Polar Coordinates

13.1 Three Dimensional Coordinate Systems

13.2 Vectors

13.3 The Dot Product

13.4 The Cross Product

13.5 Equations of Lines and Planes

13.6 Cylinders and Quadratic Surfaces

13.7 Cylindrical and Spherical Coordinates

14.1 Vector Functions and Space Curves

14.2 Derivatives and Integrals of Vector Functions

14.3 Arc Length and Curvature

14.4 Motion in Space: Velocity and Acceleration

15.1 Functions of Several Variables

15.2 Limits and Continuity

15.3 Partial Derivatives

15.4 Tangent Plane and Linear Approximations

15.5 The Chain Rule

15.6 Directional Derivatives and the Gradient Vector

15.7 Maximum and Minimum Values

15.8 Lagrange Multipliers

16.1 Double Integrals

16.2 Iterated Integrals

16.3 Double Integrals over General Regions

16.4 Double Integrals over Polar Coordinates

16.5 Application of Double Integrals

16.6 Surface Area

16.7 Triple Integrals

16.8 Triple Integrals Cylindrical and Spherical Coordinates

16.9 Change of Variables in Multiple Integrals

- 17.1 Vector Fields
- 17.2 Line Integrals
- 17.3 The Fundamental Theorem of Line Integrals
- 17.4 Green's Theorem
- 17.5 Curl and Divergence
- 17.6 Parametric Surfaces and Their Areas
- 17.7 Surface Integrals
- 17.8 Stoke's Theorem
- 17.9 The Divergence Theorem