Oklahoma School of Science and Mathematics

Ardmore Regional Center

Multivariable Calculus Syllabus

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Course Objectives: To acquaint the students with the natural extensions of the concepts of elementary calculus to vector calculus and multivariable calculus. To develop the skills needed in vector calculus and multivariable calculus for further work in mathematics or related areas.


Topics: Infinite Series (review), parametric equations, vectors and three-dimensional space geometry, partial derivatives, multiple integrals and the calculus of vector-valued functions.

Semester Schedule: We will follow the Southern Oklahoma Technology Center schedule for class days and holidays. Absences must be kept to a minimum as this is a self-directed, independent study course with instructor support. All of the instructor expectations that applied to 1st year students, also apply to 2nd year students.

Requirements: Three Ring Binder
               Loose Leaf Paper and Pencils
               Graphing Calculator

Grade Determination: 20% - Assignments
                     25% - Quizzes
                     35% - Tests
                     20% - Final (3 hours)
Multivariable Calculus

Topics and Sections Covered:

Chapter 9 – Infinite Series (Review)

9.1 Infinite Sequences
9.2 Infinite Series
9.3 Positive Series: The Integral Test
9.4 Positive Series: Other Tests
9.5 Alternating Series, Absolute Convergence and Conditional Convergence
9.6 Power Series
9.7 Operations on Power Series
9.8 Taylor and Maclaurin Series
9.9 The Taylor Approximation to a Function

Chapter 10 – Conics and Polar Coordinates

10.4 Curves Defined by Parametric Equations
10.4 Calculus with Parametric Curves
10.5 The Polar Coordinate System
10.6 Graphs of Polar Equations
10.7 Calculus in Polar Coordinates

Chapter 11 – Geometry in Space, Vectors

11.1 Cartesian Coordinates in Three-Space
11.2 Vectors in Three-Space
11.3 The Dot Product
11.4 The Cross Product
11.5 Vector-Valued Functions and Curvilinear Motion
11.6 Lines and Tangent Lines in Three-Space
11.7 Curvature and Components of Acceleration
11.8 Surfaces in Three-Space
11.9 Cylindrical and Spherical Coordinates

Chapter 12 – Derivatives for Functions of Two or More Variables

12.1 Functions of Two or More Variables
12.2 Partial Derivatives
12.3 Limits and Continuity
12.4 Differentiability
12.5 Directional Derivatives and Gradients
12.6 The Chain Rule
12.7 Tangent Planes, Approximations
12.8 Maxima and Minima
12.9 The Method of Lagrange Multipliers
Chapter 13 – Multiple Integrals

13.1 Double Integrals Over Rectangles
13.2 Iterated Integrals
13.3 Double Integrals over Nonrectangular Regions
13.4 Double Integrals in Polar Coordinates
13.5 Applications of Double Integrals
13.6 Surface Area
13.7 Triple Integrals (Cartesian Coordinates)
13.8 Triple Integrals (Cylindrical and Spherical Coordinates)
13.9 Change of Variables in Multiple Integrals

Chapter 14 – Vector Calculus

14.1 Vector Fields
14.2 Line Integrals
14.3 Independence of Path
14.4 Green’s Theorem in the Plane
14.5 Surface Integrals
14.6 Gauss’s Divergence Theorem
14.7 Stokes’s Theorem