

COURSE SYLLABUS

Course: Multivariable Calculus
Number: Math 262 XH
Units: 3 Units

Course Description: Vectors in the plane and in three-dimensional space; lines and planes in three-space; cylindrical and spherical coordinates; calculus of vector-valued functions; calculus of functions of several variables including partial derivatives, gradients and Lagrange multipliers; multiple integrals and line integrals, coordinate transformations, trajectories, fields, sinks and sources.

Prerequisites: Calculus I,II,III - Differential and Integral Calculus, Series/Approximation.

This is a fourth course in the main Calculus sequence for math and science majors. Topics include a continuing study of differential and integral calculus in 2 and 3 dimensions.

Detailed Syllabus:

0. Getting Started

1. Email and Chat
2. Learning About the Course
3. Fundamentals of LiveMath Maker and/or Mathematica

1. Vectors

1. Geometry of Vectors
2. Tangent Vectors; Velocity Vectors, Acceleration Vectors
3. Vector Length
4. Dot Products
5. Vector Projection
6. Perpendicularity
7. Lines
8. Normal Vectors
9. Cross Product
10. Planes in 3D
11. Normal Vectors on 3D Planes and Surfaces

2. The Derivative

1. Partial Derivatives
2. Gradient
3. Level Curves and Surfaces
4. Linearization
5. Total Differential
6. Data Fitting

7. Lagrange Multipliers

3. Vector Fields

1. Plotting and Trajectories
2. Flows Along and Flows Across Curves
3. Differential Equations and Vector Fields
4. Path Integrals
5. Gradient Fields
6. Line Integrals
7. Sources, Sinks
8. Divergence Theorem
9. Singularities
10. Rotation and Curl

4. Multiple Integrals

1. Basic Computation
2. u - v Substitution
3. Measurement of Volume, Mass, Density

5. Other Coordinate Systems

1. Cylindrical Coordinates
2. Spherical Coordinates
3. Integration in Other Coordinate Systems