

COURSE SYLLABUS

Course: Multivariable Calculus
Number: Math 265
Units: 4 Credits

Course Description: This is a third course in the main Calculus sequence for math and science majors. Topics include: 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, line integrals, and surface integrals; Jacobian transformations; Green, Stokes, and Gauss theorems; measuring vector field flows in two and three dimensions in relation to curves and surfaces.

Prerequisites: MATH 166 (Calculus II) or equivalent.

Detailed Syllabus:

0. Getting Started

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

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
4. 3D Integrals
5. Average Value
6. Fubini's Theorem

5. Other Coordinate Systems

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

6. Gauss, Green, Stokes Theorems

1. Green's Theorem
2. Stoke's Theorem
3. Green's Theorem
4. Generalized Fundamental Theorem of Calculus

