COURSE SYLLABUS

Course: Calculus of Several Variables
Number: Math 351
Credit-Hours: 4 credits [semester credit hours]

Course Description: Introduces functions of several variables including partial differentiation ;multiple integrals, line and surface integrals, and the theorems of Green, Gauss, and Stokes.

Prerequisites: Successful completion (C- or higher) of MATH 214 (Calculus II) or equivalent.

Course Workload: 4 semester credit hours • 3 student work hours per credit hour • 14 week Carnegie semester = 168 hours student course workload average

Examination Requirements: Proctored written final examination must be passed at 60% or higher to earn passing grade in course. "B" and "A" grade paths have additional examinations. See http://www.distancecalculus.com/grades/ for more information.

Course Professor: Robert R. Curtis, Ph.D. <robert@distancecalculus.com>

University Information: Roger Williams University, University College, 1 Empire Plaza, Providence, RI, USA 02903. Accredited by New England Commission of Higher Education (NECHE). See https://www.rwu.edu/academics/accreditations for more information.

E-Textbook: "Calculus&LiveMath" by Davis/Porta/Uhl et al. / Curtis
Mathematics Software: LiveMath™ Computer Algebra & Graphing System

Detailed Syllabus

1. Getting Started
    - 1.1. Email and Chat
    - 1.2. Learning About the Course
    - 1.3. Required Hardware
    - 1.4. Software Fundamentals

2. Vectors
    - 2.1. Geometry of Vectors
    - 2.2. Tangent Vectors; Velocity Vectors, Acceleration Vectors
    - 2.3. Vector Length
    - 2.4. Dot Products
    - 2.5. Vector Projection
    - 2.6. Perpendicularity
    - 2.7. Lines
    - 2.8. Normal Vectors
    - 2.9. Cross Product
    - 2.10. Planes in 3D
    - 2.11. Normal Vectors on 3D Planes and Surfaces

3. The Derivative
    - 3.1. Partial Derivatives
    - 3.2. Gradient
    - 3.3. Level Curves and Surfaces
    - 3.4. Linearization
    - 3.5. Total Differential
    - 3.6. Data Fitting
    - 3.7. Lagrange Multipliers

4. Vector Fields
    - 4.1. Plotting and Trajectories
    - 4.2. Flows Along and Flows Across Curves
    - 4.3. Differential Equations and Vector Fields
    - 4.4. Path Integrals
    - 4.5. Gradient Fields
    - 4.6. Line Integrals
    - 4.7. Sources, Sinks
    - 4.8. Divergence Theorem
    - 4.9. Singularities
    - 4.10. Rotation and Curl

5. Multiple Integrals
    - 5.1. Basic Computation
    - 5.2. u-v Transformations; Jacobians
    - 5.3. Measurement of Volume, Mass, Density
    - 5.4. 3D Integrals
    - 5.5. Average Value
    - 5.6. Fubini's Theorem

6. Other Coordinate Systems
    - 6.1. Cylindrical Coordinates
    - 6.2. Spherical Coordinates
    - 6.3. Integration in Other Coordinate Systems

7. Gauss, Green, Stokes Theorems
    - 7.1. Green's Theorem
    - 7.2. Stoke's Theorem
    - 7.3. Green's Theorem
    - 7.4. Generalized Fundamental Theorem of Calculus