COLLEGEWIDE COURSE OUTLINE OF RECORD

MATH 261, MULTIVARIATE CALCULUS

COURSE TITLE: Multivariate Calculus
COURSE NUMBER: MATH 261
PREREQUISITES: MATH 212 Calculus II or MATH 219 Calculus with Analytic Geometry II
SCHOOL: Arts, Sciences and Education
PROGRAM: Math
CREDIT HOURS: 4
CONTACT HOURS: Lecture: 4
DATE OF LAST REVISION: Fall, 2016
EFFECTIVE DATE OF THIS REVISION: Fall, 2017

CATALOG DESCRIPTION: Solid analytic geometry, partial differentiation, multiple integrals.

MAJOR COURSE LEARNING OBJECTIVES: Upon successful completion of this course, the student will be expected to

1. Perform basic vector operations including the dot and cross product
2. Identify space curves and surfaces including lines, planes, and quadric surfaces
3. Analyze vector-valued functions and use them to solve problems
    a. Solve problems involving displacement, velocity and acceleration
    b. Evaluate limits
    c. Differentiate and integrate
    d. Evaluate arclength
    e. Evaluate curvature
    f. Identify tangent and normal vectors
4. Analyze functions of several variables
    a. Compute partial derivatives
    b. Compute gradient vectors and directional derivatives
    c. Find local linearizations and evaluate differentials
    d. Find planes tangent to function surfaces
    e. Identify extreme values and saddle points
    f. Use the chain rule to differentiate functions of several variables
5. Evaluate double integrals in Cartesian and polar coordinates
6. Evaluate triple integrals in Cartesian, cylindrical, and spherical coordinates
7. Evaluate line integrals and surface integrals of vector fields
8. Use Green's Theorem, Stokes' Theorem, and Gauss' Divergence theorem

COURSE CONTENT: Topical areas of study include –

1. Vectors and three-dimensional objects

   a. Algebraic operations
   b. Dot (scalar) and cross (vector) products
   c. Lines in space
   d. Vector-valued functions and space curves
   e. Planes
   f. Quadric surfaces
   g. Parametric surfaces
2. Calculus of vector-valued functions
   a. Limits
   b. Derivatives
   c. Integrals
   d. Curvature
   e. Arclength
   f. Applications to motion
3. Multivariate functions and their derivatives
   a. Contour diagrams
   b. Graphs
   c. Limits and continuity
   d. Partial derivatives
   e. Gradients and directional derivatives
   f. Local linearizations and differentials
   g. Chain rule
   h. Optimization, including the method of Lagrange multipliers
4. Integration
   a. Double integrals: rectangular coordinates
   b. Double integrals: polar coordinates
   c. Change in variables in double integrals
   d. Triple integrals: rectangular coordinates
   e. Triple integrals: cylindrical and spherical coordinates
   f. Volume applications of double and triple integrals
   g. Surface area and surface integrals
5. Calculus of vectors
   a. Vector fields
   b. Line integrals
   c. Divergence and curl
   d. Green's Theorem and Stokes' Theorem
   e. Divergence Theorem

CURRENT STATEWIDE GRADING SCALE

A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

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