OHLONE COLLEGE
Ohlone Community College District
OFFICIAL COURSE OUTLINE

I. **Description of Course:**

1. **Department/Course:** MATH - 101C
2. **Title:** Calculus With Analytic Geometry
3. **Cross Reference:**
4. **Units:** 5
   Lec Hrs: 5
   Lab Hrs:
   Tot Hrs: 90.00
5. **Repeatability:** No
6. **Grade Options:** Grade Only (GR)
7. **Degree/Applicability:**
   Credit, Degree Applicable, Transferable - CSU & UC (T)
8. **General Education:** CSU General Education (Plan B)
   B2 - Mathematics/Quantitative Reasoning
   District General Education (Plan A)
   IV-B. Analytical Thinking and Oral Communication IGETC (Plan C)
   2. Mathematical Concepts/Quantitative Reasoning
9. **Field Trips:** Not Required
10. **Requisites:**
    Prerequisite
    MATH 101B Calculus With Analytic Geometry
12. **Catalog Description:**
    This course includes vector analysis, functions of several variables, partial derivatives, multiple integration, integration of vector valued functions, and applications.
13. **Class Schedule Description:**
    Vectors, functions of several variables, partial derivatives, multiple integration, and applications.
14. **Counselor Information:**
    This is the third course in the calculus sequence required for students who plan to major in mathematics, engineering or the physical sciences.

II. **Student Learning Outcomes**

The student will:

1. Use vector method to solve problems in three dimensional analytic geometry.
2. Analyze problems involving vector functions of a single variable. Topics include two dimensional projectile motion, normal and tangential acceleration and curvature.
3. Determine the extreme value(s) of a multi-dimensional function, the tangent plane to a three dimensional function, the directional derivative and gradient of a function by using partial derivatives.
4. Use double and triple integrals to determine the areas and volumes bounded by curves and surfaces, determine the surface area and center of mass of a solid. Use polar, cylindrical and spherical coordinates to aid in solving these types of problems.
5. Evaluate line and surface integrals by using Green's Theorem, the Divergence Theorem,

and Stokes' Theorem
6. Demonstrate using a graphing calculator.

III. **Course Outline:**

A. Vectors and the Geometry of Space
1. Vectors in the Plane
2. Vectors in Space
3. The Dot Product
4. The Cross Product
5. Lines and Planes in Space

B. Vector Valued Functions
1. Vector Valued Functions
2. The Calculus of Vector Valued Functions
3. Motion in Space
4. Curvature
5. Tangent and Normal Vectors
6. Parametric Surfaces

C. Functions of Several Variables and Partial Differentiation
1. Functions of Several Variables
2. Limits and Continuity
3. Partial Derivatives
4. Tangent Planes and Linear Approximations
5. The Chain Rule
6. The Gradient and Directional Derivatives
7. Extrema of Functions of Several Variables
8. Constrained Optimization of Lagrange Multipliers

D. Multiple Integrals
1. Double Integrals
2. Area, Volume, and Center of Mass
3. Double Integrals in Polar Coordinates
4. Surface area
5. Triple Integrals
6. Cylindrical Coordinates
7. Spherical Coordinates
8. Change of Variables in Multiple Integrals

E. Vector Calculus
1. Vector Fields
2. Line Integrals
3. Independence of Path and Conservative Vector Fields
4. Green's Theorem
5. Curl and Divergence
6. Surface Integrals
7. The Divergence Theorem
8. Stokes' Theorem
9. Applications of Vector Calculus

IV. **Course Assignments:**

A. Reading Assignments
B. Projects, Activities, and other Assignments
    1. Homework
    2. Projects
C. Writing Assignments

V. **Methods of Evaluation:**

A. Exams
B. Quizzes

VI. **Methods of Instruction:**

A. Lecture
B. Discussion
C. Demonstration
D. Audiovisual
E. Computer Assisted Instruction
F. Collaborative Learning

VII. **Textbooks:**

Recommended

1. Robert Smith and Roland Minton *Calculus: Early Transcendental Functions* 3th ed. Edition, McGraw Hill, 2006

Supplemental

VIII. **Supplies:**

A. Graphing Calculator