Public Course Outline

MATH 260 - Calculus and Analytic Geometry III

Units Lecture 3.50	**Units Lab** 0.50	**Units Total** 0.00 - 4.00
Lecture Weekly Contact Hours 3.50	**Lab Weekly Contact Hours** 1.50	**Total Weekly Contact Hours** 5.00
Lecture Weekly Out of Class Hours 7.00	**Lab Weekly Outside of Class Hours** 0.00	**Total Weekly Outside of Class Hours** 7.00
Total Contact Hours 80.00 - 90.00	**Total Outside of Class Hours** 112.00 - 126.00	**Total Course Hours** 192.00 - 216.00

Typically Offered: Fall, Spring, and Summer - F,SP,SU

COURSE DESCRIPTION

This third course in a three-semester calculus sequence covers vectors in two- and three-dimensional space, quadratic surfaces, vector-valued functions of several variables, partial differentiation and multiple integration, vector fields, line integrals, and conservative fields. The course is designed for mathematics, science, and engineering majors. UC CREDIT LIMITATION: Credit for MATH 260 or MATH 260H. C-ID MATH-230.

ENROLLMENT RESTRICTIONS

Prerequisite
MATH 155 or MATH 155H
Not open to students with prior credit in
MATH 260H

OUTLINE OF COURSE LECTURE CONTENT

The course lecture will address the following topics:
I. Vectors in the plane and three-dimensional space
A. Basic properties of vectors
B. Dot, cross, and triple products of vectors
C. Equations of lines and planes in three-dimensional space.

II. Vector-valued functions
A. Limits, continuity
B. Differentiation and integration with applications to velocity and acceleration
C. Tangent, normal, binormal local coordinate system
D. Arc length and curvature.

III. Functions of several variables
A. Real-valued functions of several variables, contour lines, and level surfaces
B. Quadratic surfaces
C. Limits and continuity
D. Partial differentiation and differentials; chain rule
E. Directional derivatives and gradient
F. Local and global extrema; Lagrange multipliers
G. Optimization problems.

IV. Multiple integration
A. Evaluation of double and triple integrals; Fubini's Theorem
B. Applications of double and triple integrals, such as calculations of volume, area, center of mass
C. Triple integrals in cylindrical and spherical coordinates
D. Change of Variables Theorem in multiple integrals; Jacobian.

V. Vector fields
A. Direction fields; curl and divergence
B. Conservative fields and potential function
C. Line integrals and Green's Theorem
D. Surface integrals, including integrals involving parametrically defined surfaces
E. Stokes's and divergence theorems.

VI. Using graphing technology to analyze topics
A. Graphical manner
B. Numerical manner
C. Tabular manner.

OUTLINE OF COURSE LAB CONTENT

The course lab will address the following topics:
Topics addressed in the lecture are applied to lab activities. Lab activities will include appropriate software.

PERFORMANCE OBJECTIVES

Upon successful completion of this course, students will be able to do the following:
1). Perform vector operations and interpret the results geometrically for two-dimensional and three-dimensional vectors.
2). Find the equations of lines and planes corresponding to given geometric constraints.
3). Find the tangent and normal vector of a three-dimensional curve given parametrically and calculate the arc-length.
4). Find the limit of a function of several variables at a point and analyze its continuity.
5). Find the partial derivative of a given function of several variable and interpret its meaning.
6). Find the gradient of a function of several variables and apply it to calculate directional derivatives and the direction
of maximal increase.
7). Write the equation of a tangent plane of a surface at a given point.
8). Check differentiability of a function of several variables and apply differentials for approximations.
9). Find critical points of a function of several variables and test them for the local extrema and saddle points.

10). Use Lagrange multipliers to solve optimization problems involving constraints.
11). Calculate double and triple integrals.
12). Solve applied problems using line integrals.
13). Find the divergence and curl of a vector field.
14). Apply Green's, Stokes's, and divergence theorems.
15). Use graphing technology to analyze topics in a graphical, numerical, and tabular manner.

READING ASSIGNMENTS

Reading assignments will be consistent with, but not limited by, the following types and examples:
1). Read and solve problems from the calculus course textbook.
2). Read from books, magazines, newspapers, and/or the Internet.

WRITING ASSIGNMENTS

Writing assignments will be consistent with, but not limited by, the following types and examples:
1). Write solutions to calculus homework problems.

OUTSIDE-OF-CLASS ASSIGNMENTS

Outside-of-class assignments will be consistent with, but not limited by, the following types and examples:
1). Complete reading assignments, including articles from magazines, newspapers, and/or the Internet.
2). Write solutions to assigned calculus problems.

STUDENT LEARNING OUTCOMES

1. Given a function and a region in two or three dimensional space, a student will be able to construct and evaluate the integral of the function over the region, applying the appropriate coordinate system.

METHODS OF INSTRUCTION

Instructional methodologies will be consistent with, but not limited by, the following types or examples:
1). Instructor lecture, including demonstrations of solving calculus problems.
2). Cooperative learning through small group discussion and practice in solving calculus problems.
3). Homework assignments, including reading a calculus textbook and solving and writing out solutions to exercises and problems from the textbook.
4). Instructor-provided feedback on problem-solving assignments involving calculus questions.

METHODS OF EVALUATION

Evaluation methodologies will be consistent with, but not limited by, the following types or examples:
1). Quizzes and examinations that measure the student's ability to solve calculus problems using appropriate theories, principles, and techniques.

2). Homework problems, including grading correctness and completeness of solutions of computations or computational calculus problems and exercises.

REQUIRED TEXTBOOKS

Examples of typical textbooks for this course include the following:

1. **Author** Larson, Ron, and Bruce Edwards
   Title Calculus
   Edition 11th ed.
   Publisher Brooks Cole
   Year 2017
   ISBN 978-1337275347
   This is the most current, in-print edition. No

2. **Author** Stewart, James
   Title Calculus: Early Transcendentals
   Edition 8th ed.
   Publisher Cengage
   Year 2015
   ISBN 978-1285741550
   This is the most current, in-print edition. No

COURSE REPEATABILITY

Total Completions Allowed: 1

Rationale for multiple enrollments:

Courses Related in Content (CRC) in Physical Education, Visual Arts, and Performing Arts:

DISTANCE ED (FORM A)

Type of Approval: 100% Online or Hybrid

You may indicate here which component(s) of the course should never be conducted online (e.g. proctored exams, labs, in-person orientation, etc.):

GENERAL EDUCATION/TRANSFER

Fulfills MiraCosta College Associate Degree Requirements:

- **MiraCosta General Education**
  - Area A2 - Communication & Analytical Thinking
- **IGETC Area 2: Mathematical Concepts and Quantitative Reasoning**
  - A: Mathematic

- **CSU GE Area B: Scientific Inquiry and Quantitative Reasoning**
    - B4 - Mathematics/Quantitative Reasoning

ARTICULATION

Transfer Status: Acceptable for Credit: CSU, UC -

CSU/IGETC GE Area(s): 137 - CSU, UC, CSU GE B4, IGETC 2A

THIS COURSE IS INCORPORATED INTO THE FOLLOWING PROGRAM(S)

Liberal Arts with an Area of Emphasis in Mathematics and Sciences *ARCHIVED* AA Degree
Mathematics for Transfer *CURRENT* AS-T Degree
Liberal Arts with an Area of Emphasis in Mathematics and Sciences *CURRENT* AA Degree
Mathematics for Transfer *FUTURE* AS-T Degree