MATH G280: CALCULUS 3

Item	Value
Curriculum Committee Approval Date	12/07/2021
Top Code	170100 - Mathematics, General
Units	4 Total Units
Hours	72 Total Hours (Lecture Hours 72)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• GWC Mathematic Competency (GB2)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 2A Math Concepts (2A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 2A Math Concepts (2A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

This course is the third in a three-course sequence, designed for mathematics, science, and engineering majors. Topics include vectors in three-dimensional space, curves, and surfaces, functions of several variables, partial differentiation, the gradient, the curl, the divergence, multiple integration, Green's Theorem, Gauss' (Divergence) Theorem, and Stokes' Theorem. The student should plan to complete the first three semesters of calculus at Golden West College to maintain continuity. PREREQUISITE: MATH G185. Transfer Credit: CSU; UC. C-ID: MATH 230. **C-ID:** MATH 230.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Evaluate a triple integral using cylindrical or spherical coordinates.
3. Find the tangent plane to a surface at a point.
4. Find any local extrema or saddle points of a function of several variables.

Course Objectives

- 1. Perform vector operations.
- 2. Determine equations of lines and planes.
- 3. Compute arc length and curvature.
- 4. Graph using rectangular, cylindrical and spherical coordinates.
- 5. Evaluate the limit of a function at a point.
- 6. Evaluate derivatives.
- 7. Write the equation of a tangent plane at a point.
- 8. Determine differentiability.
- 9. Find local and global extrema and test for saddle points.
- 10. Solve constraint problems using Lagrange multipliers.
- 11. Evaluate two and three dimensional integrals.
- 12. Evaluate line and surface integrals.
- 13. Find the divergence and curl of a vector field.
- 14. Apply Greens, Stokes, and divergence theorems.

Lecture Content

Vectors and Geometry of Space Three-Dimensional Coordinate Systems Vectors and Vector Operations in Two and Three Dimensions The Dot Product; Projection The Cross Product; Vector Triple Products Vector and Parametric Equations of Lines Vector, Parametric, and Rectangular Equations of Planes Cylindrical and Spherical Coordinates Sphere; Cylindrical and Quadric Surfaces Vector Functions Vector Functions and Space Curves Derivatives and Integrals of Vector Functions Change of Parameter Arc Length and Curvature Unit Tangent, Normal, and Binomal Vectors Motion in Space: Velocity and Acceleration Partial Derivatives Functions of Several Variables Level Curves and Surfaces Limits and Continuity Partial Derivatives Differentiability, Differentials, and Linear Approximations The Chain Rule Higher Order Derivatives Directional Derivatives and Gradients Tangent Planes and Normal Vectors Local and Global Maxima and Minima; Saddle Points Lagrange Multipliers Multiple Integrals Double Integrals; Double Integrals over General Regions Double Integrals in Polar Coordinates Triple Integrals Triple Integrals in Cylindrical and Spherical Coordinates Change of Variables in Multiple Integrals; Jacobians Applications of Multiple Integration such as Area, Volume, Surface Area, Center of Mass, Centroid, Moments of Inertia Vector Calculus Vector Fields; Gradient Vector Fields Line Integrals Independence of Path; Conservative Vector Fields Curl and Divergence Greens Theorem Parametric Surfaces and Their Areas Su rface Integrals; Flux The Divergence Theorem Stokes Theorem

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

The primary mode of instruction is the lecture/demonstration method. Some sections may ultilize graphing calculators.

Reading Assignments

Course textbook which provides explanations, worked examples, and problems to be solved.

Writing Assignments

Students will demonstrate clarity, mathematical preciseness and problem solving skills when theywrite their own solutions to regular homework problems, quiz problems, and exam problems.

Out-of-class Assignments

Homework assignments as given by instructor.

Demonstration of Critical Thinking

Students will demonstrate critical thinking and problem-solving skills by using logic, in conjunction withpast mathematical solving techniques, to solve and interpret a variety of applications not previously seen.Demonstrations will be shown by completing assignments, participating in discussions, and completingrequired exams and quizzes.

Required Writing, Problem Solving, Skills Demonstration

Tests, examinations, homework or projects where students demonstrate their mastery of the learningobjectives and their ability to devise, organize and present complete solutions to problems.

Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Stewart, James. Multivariable Calculus, 9 ed. Cengage, 2021 2. Required Strang, Gilbert Herman, Edwin. Calculus Volume 3, ed. OpenStax (OER)(latest), 2016 Rationale: .