COURSE OUTLINE OF RECORD

Number: MATH G280  TITLE: Calculus 3

ORIGINATOR: Gary Kirby Jr.  EFF TERM: Fall 2018
FORMERLY KNOWN AS:  DATE OF OUTLINE/REVIEW: 04-18-2018
CROSS LISTED COURSE: TOP NO: 1701.00
CID: Math 230

SEMESTER UNITS: 5.0  HRS LEC: 90.0  HRS LAB: 0.0  HRS OTHER: 0.0
CONTACT HRS TOTAL: 90.0  STUDY NON-CONTACT HRS RECOMMENDED: 180.0
CATALOG DESCRIPTION:
This is the third course 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.

JUSTIFICATION FOR COURSE:
Minor revision in content (details in one subpoint) in order to fully align with the C-ID descriptor for Multivariable Calculus

PREREQUISITES:
- MATH G185: Calculus 2 with a minimum grade of C or better
- or
- MATH A185: Calculus 2 with a minimum grade of C or better
- or
- MATH A185H: Calculus 2 Honors with a minimum grade of C or better
- or
- MATH C185: Calculus 2 with a minimum grade of C or better

COREQUISITES:

ADVISORIES:

ASSIGNED DISCIPLINES: Mathematics

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00

CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]

GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]

OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]

TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]

BASIC SKILLS STATUS: Yes [ ] No [X] LEVELS BELOW TRANSFER: Not Applicable

CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable

NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course

OCCUPATIONAL (SAM) CODE: E

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS:
REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]
Liberal Arts: Emphasis in Mathematics (Associate in Arts)
Mathematics (Associate in Science for Transfer)
Mathematics (Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:
IGETC Area 2: Mathematical Concepts and Quantitative Reasoning
2A: Mathematics
CSU GE Area B: Scientific Inquiry and Quantitative Reasoning
B4 - Mathematics/Quantitative Thinking

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

1. Evaluate a triple integral using cylindrical or spherical coordinates.
2. Find the tangent plane to a surface at a point.
3. Find any local extrema or saddle points of a function of several variables.
4. Use Stokes' Theorem to find the flux of curl(\(\mathbf{F}\)) across an oriented surface, given a vector valued function, \(\mathbf{F}\).

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.
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 Green's, Stokes', and divergence theorems.

COURSE CONTENT:

LECTURE CONTENT:

A. Vectors and Three Dimensional Space
   1. Rectangular coordinates in 3-space; spheres; cylindrical surfaces
   2. Vectors and Vector Operations in Two and Three Dimensions
   3. Dot Product; Projections
   4. Cross Product; Vector Triple Products
   5. Vector and Parametric Equations of Lines
   6. Vector, Parametric, and Rectangular Equations of Planes in 3-Space
   7. Quadric Surfaces
   8. Cylindrical and Spherical Coordinates

B. VECTOR-VALUED FUNCTIONS
   1. Introduction to Vector-Valued Functions
2. Calculus of Vector-Valued Functions
3. Change of Parameter; Arc length
4. Unit Tangent, Normal, and Binormal Vectors
5. Curvature
6. Motion Along a Curve
7. Kepler's Laws of Planetary Motion (Optional)

C. PARTIAL DERIVATIVES
1. Functions of Two or More Variables
2. Level Curves and Surfaces
3. Limits and Continuity
4. Partial Derivatives
5. Differentiability, Differentials, and Local Linearity
6. Higher Order Derivatives
7. The Chain Rule
8. Directional Derivatives and Gradients
9. Tangent Planes and Normal Vectors
10. Local and Global Maxima and Minima of Functions of Two Variables
11. Saddle Points
12. Lagrange Multipliers.

D. MULTIPLE INTEGRALS
1. Double Integrals
2. Double Integrals over Nonrectangular Regions
3. Double Integrals in Polar Coordinates
4. Parametric Surfaces; Surface Area
5. Triple Integrals
6. Centroid, Center of Gravity, Theorem of Pappus
7. Triple Integrals in Cylindrical and Spherical Coordinates
8. Change of Variables in Multiple Integrals; Jacobians

E. TOPICS IN VECTOR CALCULUS
1. Vector Fields.
2. Gradient Vector Fields
3. Line Integrals
4. Independence of Path; Conservative Vector Fields
5. Divergence and Curl
6. Green's Theorem
7. Surface Integrals
8. Applications of Surface Integrals; Flux
9. The Divergence Theorem.
10. Stokes' Theorem

METHODS OF INSTRUCTION:
A. Lecture:
B. Tutoring – noncredit:
C. Direct Study/IS:
D. Other simultaneous interactive:
E. Other passive medium:

INSTRUCTIONAL TECHNIQUES:
COURSE ASSIGNMENTS:
Reading Assignments
Textbook explanations of topics.

Out-of-class Assignments
Optional computer assignments

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

METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Essay Examinations
Objective Examinations
Report
Projects (ind/group)
Problem Solving Exercises
Oral Presentations
Skills Demonstration

Demonstration of Critical Thinking:
Students will demonstrate critical thinking and problem solving skills by completing handwritten homework assignments consisting of appropriate exercises, participating in classroom discussions, and completing required exams and quizzes.

Required Writing, Problem Solving, Skills Demonstration:
Students will demonstrate clarity, mathematical preciseness and problem solving skills when they write their own solutions to regular homework problems, quiz problems, and exam problems.

TEXTS, READINGS, AND RESOURCES:
TextBooks:

LIBRARY:
Adequate library resources include:

Comments:

Attachments:
Attached Files