ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

COMMON COURSE OUTLINE

Course discipline/number/title: MATH 2237: Multivariable and Vector Calculus

A. CATALOG DESCRIPTION
1. Credits: 5
2. Hours/Week: 5
3. Prerequisites (Course discipline/number): MATH 1128
4. Other requirements: None
5. MnTC Goals (if any): NA

B. COURSE DESCRIPTION: This course is first in a sequence which is a continuation of the first year of calculus. Topics are selected from the following: coordinate and vector geometry, vector valued functions, velocity-acceleration and curvature, cylindrical and spherical coordinate systems, partial differentiation and applications, double and triple integrals, Green's-Stokes' Divergence Theorems, and Frenet Formulas.

C. DATE LAST REVISED (Month, year): March, 2022

D. OUTLINE OF MAJOR CONTENT AREAS:
1. Three-Dimensional Coordinate systems and Graphs of Multivariable Function
2. Euclidean Vectors, Inner Products, Cross Products, Projection, and Applications
3. Vector Valued functions
4. Multivariable limits, partial derivatives, total derivatives, and optimization
5. Multiple Integrals, Change of Coordinates, Line Integrals, and Surface Integrals
6. Vector Fields, Divergence, Curl, Green's Theorems, Stokes's Theorem, and the Divergence Theorem

E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Calculate and interpret the geometry of vector algebra, inner products, and cross products.
2. Compute tangent vectors, normal vectors, and binormal vectors to a vector valued function.
3. Calculate limits and identify continuity of multivariable functions.
4. Compute partial derivatives, directional derivates, total derivatives and gradients of multivariable functions.
5. Methods of solution for Unconstrained and Constrained Optimization.
6. Set up and evaluate multiple variable integrals in appropriate coordinate systems (including rectangular, cylindrical, and spherical coordinate systems).
7. Calculate Curl and Divergence of a vector field as well as convey their physical interpretations.
8. Set up and evaluate line and surface integrals.
9. Evaluate integrals in vector fields with Green's, Stokes, and the Divergence Theorem.

F. LEARNING OUTCOMES (MNTC): NA

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Examinations
2. Quizzes
3. Homework
4. Projects
5. Comprehensive Final Exam

H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.

I. SPECIAL INFORMATION (if any):
1. Graphing calculator required. (Texas Instruments Recommended)