SYLLABUS
PART I
EDISON COMMUNITY COLLEGE
MTH 223S CALCULUS AND ANALYTICAL GEOMETRY III
5 CREDIT HOURS

COURSE DESCRIPTION
A standard third semester calculus course. Topics include: vector calculus; partial derivatives with applications; multiple integrals; surface and line integrals; Stoke's theorem and Gauss's theorem. Prerequisite: Grade of "C" or better in MTH 222S.

COURSE GOALS

The student will:

Bloom's Level		Gen Ed Outcomes
3	1. Differentiate and integrate vector-valued functions and use these derivatives and integrals to describe motion in space.	1, 3
5	2. Evaluate limits and determine the continuity and differentiability of functions of several variables.	1, 3
1	3. Describe graphs, level curves, and level surfaces of functions of several variables.	1, 3
3	4. Use tangent and normal vectors to find arc length and curvature of space curves and to identify and interpret the tangential and normal components of acceleration.	1, 3
3	5. Find partial derivatives, directional derivatives, and gradients and use them to solve applied problems.	1, 3
3	6. Find differentials of functions of several variables and use them to solve applied problems.	1, 3
1	7. Find equations of tangent planes and normal lines to surfaces that are given implicitly or parametrically.	1, 3
3	8. Use the chain rule for functions of several variables (including implicit differentiation).	1, 3
3	9. Find critical points for functions of several variables using first partials and interpret them as relative extrema/saddle points using the second partials test. Find absolute extrema on a closed region. Apply these techniques to optimization problems.	1, 3
3	10. Use Lagrange multipliers to solve constrained optimization problems.	1, 3
5	11. Evaluate multiple integrals in appropriate coordinate systems such as rectangular, polar, cylindrical and spherical coordinates and apply them to solve problems involving volume, surface area, density, moments and centroids.	1, 3
3	12. Use Jacobians to change variables in multiple integrals.	1, 3
5	13. Evaluate line and surface integrals. Identify when a line integral is independent of path and use the Fundamental Theorem of Line Integrals to solve applied problems.	1, 3
3	14. Find the curl and divergence of a vector field, the work done on an object moving in a vector field, and the flux of a field through a surface and use these ideas to solve applied problems.	1, 3
3	15. Use Green's Theorem, the Divergence (Gauss's) Theorem and Stokes's Theorem.	1, 3

CORE VALUES

The Core Values are a set of principles that guide in creating educational programs and environments at Edison. They are communication, ethics, critical thinking, human diversity, inquiry and respect for learning, and interpersonal skills and teamwork. The goals, objectives, and activities in this course will introduce or reinforce those Core Values whenever possible.

TOPIC OUTLINE

1. Vector Functions and Space Curves
2. Derivatives and Integrals of Vector Functions
3. Arc Length and Curvature
4. Derivatives and Integrals of Vector Functions
5. Parametric Surfaces
6. Functions of Several Variables
7. Limits and Continuity
8. Partial Derivatives
9. Tangent Planes and Linear Approximations
10. The Chain Rule
11. Directional Derivatives and the Gradient Vector
12. Maximum and Minimum Values
13. Lagrange Multipliers
14. Double Integrals over Rectangles
15. Iterated Integrals
16. Double Integrals over General Regions
17. Double Integrals over Polar Coordinates
18. Applications of Double Integrals
19. Surface Area
20. Triple Integrals
21. Triple Integrals in Cylindrical and Spherical Coordinates
22. Change of Variables in Multiple Integrals
23. Vector Fields
24. Line Integrals
25. The Fundamental Theorem for Line Integrals
26. Green's Theorem
27. Curl and Divergence
28. Surface Integrals
29. Stokes' Theorem
30. The Divergence Theorem