MATH 252 Calculus III

This course emphasizes on vector functions (continuity, derivatives, and integrals), parametric curves and surfaces, polar coordinates, as well as functions of several variables (including continuity and partial derivatives, gradient, directional derivatives). Topics also include the chain rule, double and triple integrals, iterated integrals, integration using polar, cylindrical, and spherical coordinates, change of variables, line, and surface integrals (including surface area), curl and divergence, and the integral theorems of Green, Stokes, and Gauss.

(Pre-requisites: Math 152 or Math 154)

Course Learning Outcomes:

By the end of the course, students will be able to:

1. Demonstrate understanding of the fundamental geometric concepts and methods of differential and integral calculus of several variables.
2. Apply vector calculus to engineering problems.
3. Formulate and solve complex engineering problems by applying principles of engineering, science, and mathematics.
4. Employ numerical software to solve and analyse real life problems using calculus of several variables.

Textbook & Course Materials:

- James Stewart, Calculus, Metric Edition, 8th Edition, 2015, Cengage.

Course Content:

1. 2-D and 3 - D coordinate systems
2. Vectors
3. The dot product
4. The cross product
5. Equations of lines and planes
6. Cylinders and quadratic surfaces
7. Functions of several variables
8. Limits and continuity
9. Partial Derivatives
10. Tangent planes and linear approximations
11. The chain rule
12. Directional derivatives and gradient vector
13. Maximum and minimum values
14. Lagrange multipliers
15. Double integrals over rectangles
16. Double integrals over general regions

17. Integration over polar coordinates
18. Triple integrals
19. Triple integrals in cylindrical coordinates
20. Triple integrals over spherical coordinates
21. Vector fields
22. Line Integrals
23. Fundamental theorem for line integrals
24. Green's theorem
25. Curl and divergence
26. Parametric surfaces and their areas
27. Surface integrals
28. Stokes's theorem
29. The divergence theorems