Course Code	Course Title	Credit Hours
CS3201	Multivariate Calculus	3(3+0)

Prerequisites: Calculus and Analytical Geometry

Course Description: This is an extension of single variable calculus. It focuses on the calculus as it applies to functions of two or more variables. The concept learnt in this course will be useful in analyzing geometry of curves and surfaces.

Aims and Objectives: On completing this course, students will have:
- An understanding of the basic concepts of multivariable calculus.
- Fluency with such concepts as parametric curves, matrix algebra, gradients, directional derivatives, and multiple integrals will be gained.
- Physical interpretation of these concepts and application in constrained-unconstrained optimization will be acquired.

Course Contents: Calculus of parametric curves, polar coordinates, coordinates and vectors in three-dimensions, dot and cross products, lines and planes in three-dimensions, conic sections and quadratic surfaces, parametric curves in three-dimensions, functions of two and three variables, partial derivatives, tangent planes and differentiability, the chain rule, the gradient and directional derivatives, maxima and minima, Lagrange multipliers, double integrals over rectangles and general regions, double integrals in polar coordinates, applications of double integrals, surface area as double integral, triple integral, cylindrical and spherical coordinates, vector fields and line integrals, Greens theorem, divergence and curl, Stokes theorem, divergence theorem.

Reference Books

1. Stewart, J., & Cole, B. (2015). *Multivariable Calculus (8th Edition)*. Cengage Learning.
2. Briggs, W. L., Cochran, L., & Gillett, B. (2014). *Multivariable Calculus (2nd Edition)*. Pearson Education India.