Multivariable Calculus

Code	Credit Hours
MATH-234	3+0

Course Description

Explore multivariable calculus, covering limits, continuity, partial derivatives, and optimization techniques. Navigate through vector and scalar functions, understanding their fields and derivatives. Delve into concepts like divergence, curl, and line integrals, emphasizing applications in Green's Theorem and Stokes's Theorem. Extend the analysis to triple integrals and Gauss's Divergence Theorem in spatial calculus. Conclude with Fourier series, Fourier integrals, and the Fourier transform, providing essential tools for signal processing and scientific research. Engage in practical applications to reinforce theoretical understanding. Ideal for students pursuing mathematics, engineering, and scientific research.

Text Book:

1. Calculus and Analytic Geometry (9^{th} Edition)
2. Thomas's Calculus (11^{th} Edition)
3. Advanced Engineering Mathematics (10^{th} Edition) Ervin Kreyszig

Reference Book:

1. Calculus Volume 3 by EDWIN "JED" HERMAN and GILBERT STRANG
2. Calculus with Analytical Geometry, 6th edition. Swokowski, Olinick and Pence.1994.Thomson Learning EMEA, Ltd.

Prerequisites

MATH-101

ASSESSMENT SYSTEM

Quizzes	10-15%
Assignments	5-10%
Mid Terms	25-35%
ESE	40-50%

Week No.	Topics
1	Functions of Several Variables
2	Limits and Continuity
3	Partial Derivatives
4	Linear Approximations, The Chain Rule
5	Maxima/Minima Problems
6	Cylindrical and Spherical Coordinates, Change of Variables
7	Vector and Scalar Functions and their Fields, Derivative of a Vector Function
8	Gradient of a Scalar Field, Directional Derivatives
9	**Mid Semester Exam**
10	Divergence and Curl of a Vector Field
11	Smooth Curve, Line Integrals, Path Independence of Line Integrals
12	Double Integrals
13	Green's Theorem in the Plane
14	Surfaces and Surface Integrals, Stokes's Theorem
15	Triple Integrals and Gauss's Divergence Theorem
16	Fourier Series of Functions of Arbitrary Period and of Even and Odd Functions, Half-Range Expansions
17	Fourier Integrals, Fourier Transform
18	**End Semester Exam**