

Course Title	CALCULUS-I
Course Code	MPHY-101
Credit Hours	CH3
Pre- requisites	FSc / A-Level (Physics) or equivalent
Learning Outcomes	The objective of this course is to acquaint students with the fundamental concepts of limit, continuity, differential and integral calculus of functions of one variable
Contents	<p>Functions: Functions, Limit of a function, domain, range, types, Graphical approach, properties, theorems; Limits of polynomials, rational, and transcendental functions; One-sided limits; Continuity.</p> <p>Differentiation: Derivatives of polynomials, rational, exponential, logarithmic, and trigonometric functions; The chain rule; Implicit differentiation; Rates of change in natural and social sciences; Related rates; Linear approximations and differentials; Higher derivatives, Leibnitz's theorem, Increasing and decreasing functions, relative extrema, optimization; First derivative test for relative extrema; Convexity and point of inflection; Second derivative test for extrema; Curve sketching; Mean value theorems; Indeterminate forms and L'Hopital's rule.</p> <p>Integration: Integration, antiderivatives, and integrals; Riemann sums and the definite integral, Properties of the integral; The fundamental theorem of calculus; The substitution rule; Integrals of elementary, hyperbolic, trigonometric, logarithmic, and exponential functions; Integration by parts, substitution, and partial fractions; Approximate integration; Improper integrals; Gamma functions. Area between curves, average value, arc length, area of a surface of revolution; Parameterized curves and polar coordinates: Curves defined by parametric equations, calculus with parametric curves (tangents, areas, arc length), polar coordinates (polar curves, tangents to polar curves), areas and arc length in polar coordinates.</p>
Teaching-learning Strategies	Classroom teaching / Lecturing
Assignments- Types and Number	Problem/work sheets: 3-4
Assessment and Examinations	<p>Mid-Term Assessment: 35%</p> <p>Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.</p> <p>Final Term Assessment: 40%</p>
Text Books	<ol style="list-style-type: none"> 1. Calculus by Thomas (13th Edition), Addison Wesley (2005). 2. Calculus by H. Anton, I. Bevens, S. Davis (8th Edition), Wiley (2005). 3. Calculus Single and Multivariable by D. H. Hallett, A. M. Gleason, W. G. McCallum (3rd Edition) Wiley (2002). 4. Calculus and Analytics Geometry by C. H. Edward and E. D Penney, Prentice Hall (1988).