Course Code	**:**	**MAT 112**
Course Title	:	Differential and Integral Calculus
Credit Hour	:	3.0
Prerequisite	:	N/A
Course Rationale	:	The purpose of this course is to give a clear concept about several functions and their derivatives with geometrical representation, application of derivatives and related theorems in scientific problems. To introduce students to learn the various methods of integration at undergraduate level and to calculate the length of curves, of curved surfaces and volumes of solid revolutions.
Course Content	:	Functions: Several functions, Increasing and Decreasing functions, graphs of functions. Limits, Continuity and Differentiability of functions. Differential Coefficients: Differentiation of Explicit, Implicit and Parametric functions. Successive Differentiation: Definition, Use of De-Moivre's Theorem, Leibnitz's Theorem. General Theorems: Rolle's Theorem, Mean-value Theorem, Taylor's Theorem with remainder, problems and applications. Partial Differentiation: Euler's Theorem on homogeneous function, Jacobians and its properties. Maxima and Minima of one and two variables with problems and applications. Tangent and Normal in Cartesian & Polar Coordinates. Integration: Methods of Integration, Integration by parts, Special types of Integration, Integration by Reduction, Definite Integrals, properties of Definite Integrals, Gamma function and Beta function. Rectification, Areas of plane curves, Volumes and Surfaces of solids of revolution.
Course Learning Outcomes (CLO)		1. Ability to identify the several functions with their different graphical representation. Also will be able to recognize the intervals where the function has the Increasing and Decreasing behavior. 2. Ability to understand the existence of limiting value of function, to investigate the function is either continuous or differentiable at a point or not. If not continuous ability to classify the discontinuities.Capability to interpret the derivative of a function as the instantaneous rate of change in quality modeled to solve the physical problems. 3. Will be able to distinguish derivative oriented theories which may be applied in different physical phenomena and to explain the consequences. 4. Demonstrate ability to find length of a curve, areas of regions and area between curves, volume of surface of revolution, complicated function in most standard and easiest methods of integration. 5. Achieve the ability to apply calculus at the undergraduate and postgraduate math related courses.Can seek employment in the math related fields. 6. After completing the course students will demonstrate an intuitive and computational understanding to explain the consequence of problems orally or in well-written form.

References	:	1.	Mohammad & Bhattacharjee - Differential Calculus
		2.	Das and Mukharjee - Differential Calculus
		3.	Das and Mukharjee - Integral Calculus
Grading System	:	As per the approved Grading scale of Metropolitan University (appendix-2).	