



Calculus (1)

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	101	Calculus (1)	4	3	0	2	

Objectives:

- To understand the concept of limits and continuity of a function.
- To be able to find and interpret the derivatives of functions.
- To understand the meaning of derivative in terms of a rate of change and local linear approximation and to use derivatives to solve a variety of problems.
- To understand the meaning of definite integral as a limit of Riemann sum.
- To be able find the integral of elementary functions.

Syllabus:

- **Limits and Continuity:** The Concept of Limit, Computation of Limits, Continuity and its Consequences, The Method of Bisections, Limits Involving Infinity, Asymptotes, Formal Definition of the Limit, Exploring the Definition of Limit Graphically.
- **Differentiation:** Tangent Lines and Velocity, The Derivative, Computation of Derivatives: The Power Rule, Higher Order Derivatives, The Product and Quotient Rules, The Chain, Derivatives of Trigonometric Functions and their inverses, Derivatives of Exponential and Logarithmic Functions, Hyperbolic functions and their inverses, Derivatives of hyperbolic functions, Implicit Differentiation, The Mean Value Theorem, Numerical Differentiation.
- **Applications of Differentiation:** Linear approximation and Newton's Method, Indeterminate Forms and L'Hopital's Rule, Extrema Values, Monotonic Functions and the First Derivative Test, Concavity and the Second Derivative Test, Overview of Curve Sketching, Optimization, Related Rates.
- **Integration:** Anti-derivatives, Sums and Sigma Notation, Partitions and Reimann sums, Area, The Definite Integral, The Fundamental Theorem of Calculus, Indefinite Integral and Integration by Substitution, Area between curves.

References:

- **Calculus, Early Transcendental Functions**, Robert Smith, Roland Minton, McGraw-Hill Science Engineering, 2007.
- **Calculus**, O. Swokowski, et al, PWS Pub. Co.; 6th edition (1994).
- **Calculus Early Transcendentals**, C. Henry Edwards, David E. Penney, Prentice Hall, 2008.

