



Level One

Calculus (1)

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

Objectives:

- To provide basics of calculus.
- To get the intuitive knowledge of limits and continuity of a function.
- To be able to find and interpret the derivative of elementary functions.
- To be able find and interpret the integral of elementary functions.

Syllabus:

- **Limits and Continuity:** A Brief Preview of Calculus: Tangent Lines and the Length of a Curve, 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, Numerical Differentiation, Computation of Derivatives: The Power Rule, Higher Order Derivatives, The Product and Quotient Rules, The Chain, Derivatives of Trigonometric Functions, Derivatives of Exponential and Logarithmic Functions, Implicit Differentiation and Inverse Trigonometric Functions, The Mean Value Theorem.
- **Applications of Differentiation:** Indeterminate Forms and L'Hopital's Rule, Maximum and Minimum Values, Increasing and Decreasing Functions, Concavity and the Second Derivative Test, Overview of Curve Sketching, Optimization, Related Rates.
- **Integration Techniques:** Antiderivatives, Integration by Substitution, Review of Formulas and Techniques, Integration by Parts, Trigonometric Techniques of Integration, Integrals Involving Powers of Trigonometric Functions, Trigonometric Substitution, Integration of Rational Functions Using Partial Fractions, Brief Summary of Integration Techniques, Integration Tables.

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.
- **Schaum's Outline of Calculus**, Elliott Mendelson, Frank Ayres, McGraw-Hill, 1999.

