

**APPLIED CALCULUS I**  
*MATH 113 : 4 Credit hours ( 3 lectures, 0 lab, 2 exercises )*

**Prerequisites:**

*No prerequisites.*

**Objectives:**

This course is designed to learn fundamental concepts, techniques, and applications of calculus.

- To understand the fundamental concepts of calculus.
- To study techniques of differentiation and integration.
- To study numerical differentiation and integration and some numerical approximation methods.

**Course Description:**

This Course Teaches Applied calculus I

**Contents:**

- Limits, continuity and there properties.
- Differentiation; derivatives, properties of differentiation. Chain rule.

Derivatives of algebraic, trigonometric and trigonometric functions. Exponential, logarithmic, and hyperbolic functions, and their derivatives. Implicit differentiation and inverse function's derivative. Derivatives of high order. L'Hospital's Rule and undetermined forms.

- Absolute and local extrema, critical points, tests for local extrema, concavity and inflection points, and applications. Rolle's theorem and the Mean Value Theorem. Curve sketching using calculus. Optimization problems.
- Differentials and applications.
- Antiderivative functions and indefinite integral. Integral methods, integration by substitution and by parts, trigonometric integrals, integration of rational functions.
- - Areas under curves. Definite integral and its properties. Mean value theorem for the integral. The fundamental theorems of calculus. Numerical differentiation, Newton and fixed point iteration methods.
- Numerical integration: rectangle, trapezoidal, and Simpson's rules.

*The instructor should stress on using mathematical software through out the course*

**References:**

- *CALCULUS* , 6<sup>th</sup> edition Swokowski, Olinick , Pence PWS Publishing Company.
- *CALCULUS*, By Larson , Hostetler & Edwards, Publisher: Houghton Mifflin
- *SCHAUM'S OUTLINE OF CALCULUS*, Frank Ayres, Elliott Mendelson Graw Hill Mc