NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MTH 261 – APPLIED CALCULUS I (3 CR.)

Course Description

Introduces limits, continuity, differentiation and integration of algebraic, exponential and logarithmic functions, and techniques of integration with an emphasis on applications in business, social sciences and life sciences. Credit will not be awarded for both MTH 261: Applied Calculus I and MTH 263 - Calculus I. **This is a Passport and UCGS transfer course.** Lecture 3 hours. Total 3 hours per week.

General Course Purpose

The general purpose of this one-semester course is to prepare students in business, social sciences and life sciences to apply concepts of differentiation and integration of algebraic, exponential and logarithmic functions in future mathematics and degree coursework.

Course Prerequisites/Corequisites

Prerequisite: Completion of MTH 161 or equivalent with a grade of C or better.

Course Objectives

- Limits and Continuity
  - Calculate and interpret limits at particular x-values and as x approaches infinity.
  - Determine whether a function is continuous at a given point and over open/closed intervals.
- Derivatives
  - Find the derivative of a function applying the limit definition of the derivative.
  - Interpret the derivative as both the instantaneous rate of change of a function and the slope of the tangent line to the graph of a function.
  - Use the Power, Product, Quotient, and Chain rules to find the derivatives of algebraic, exponential, and logarithmic functions
- Applications of the Derivative
  - Find the relative extreme values for a continuous function using the First and Second Derivative Tests.
  - Apply derivatives to solve problems in life sciences, social sciences, and business.
  - Find higher order derivatives and interpret their meaning.
  - Use derivatives to model position, velocity, and acceleration.
  - Apply First and Second Derivative Tests to determine relative extrema, intervals of increase and decrease, points of inflection, and intervals of concavity.
  - Graph functions, without the use of a calculator, using limits, derivatives and asymptotes.
  - Use derivatives to find absolute extrema and to solve optimization problems in life sciences, social sciences, and business.
  - Perform implicit differentiation and apply the concept to related rate problems.AND/OR
  - Evaluate partial derivatives and interpret their meaning.
- Integration and Its Applications
  - Use basic integration formulas to find indefinite integrals of algebraic, exponential, and logarithmic functions.
  - Develop the concept of definite integral using Riemann Sums.
  - Evaluate definite integrals using Fundamental Theorem of Calculus.
  - Use the method of integration by substitution to determine indefinite integrals.
  - Evaluate definite integrals using substitution with original and new limits of integration.
  - Calculate the area under a curve over a closed interval [a, b].
  - Calculate the area bounded by the graph of two or more functions by using points of intersections.
  - Use integration to solve applications in life sciences such as exponential growth and decay.

- Use integration to solve applications in business and economics, such as future value and consumer and producer's surplus

Major Topics to be Included

a) Limits and Continuity
b) Derivatives
c) Applications of the Derivative
d) Integration and Its Applications