

**NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
MTH 271 - APPLIED CALCULUS I (3 CR.)**

Course Description

Presents limits, continuity, differentiation of algebraic and transcendental functions with applications, and an introduction to integration.

General Course Purpose

The purpose of this course is to provide the student with majors in business, social science, or biology with a one-year sequence in calculus developed with a minimum of mathematical rigor; applications suitable for these majors are emphasized. This course is not appropriate for the student with majors in mathematics, engineering, or the physical sciences. Current technology is incorporated in this course.

Course Prerequisites/Corequisites

Prerequisites: MTH 163 or MTH 166 or two units of algebra, one unit of geometry, and one-half unit of pre-calculus. Credit will not be awarded for both MTH 173 and MTH 271.

Course Objectives

As a result of the learning experience in this course, the student should be able to:

- Evaluate limits
- Find derivatives of algebraic, exponential, and logarithmic functions
- Use derivatives to find equations of tangent lines, to sketch curves, and to solve maximum and minimum problems.
- Find antiderivatives (indefinite integrals) of algebraic and exponential functions.
- Evaluate definite integrals
- Use a graphing device as an aid in problem solving

Major Topics To Be Included

- A. Review of Functions
 1. Definition and operations, including composition
 2. Linear functions, including slope
 3. Classes of functions
- B. Limits
 1. Intuitive definition
 2. Evaluation techniques
 3. Continuity
- C. The Derivative
 1. Definition
 2. Slope of a tangent line to a curve at a point
 3. Differentiation techniques (algebraic functions)
 - a. Power rule
 - b. Product rule
 - c. Quotient rule
 - d. Chain rule
 4. Higher order derivatives
- D. Applications of the derivative

1. Graph sketching
 - a. Maximum & minimum (absolute and local)
 - b. Asymptotes (horizontal and vertical)
 - c. Increasing & decreasing behavior of functions
 - d. Concavity
 2. Extrema
 - a. In economics and business
 - b. In biology
 - c. In physical problems, eg, velocity & acceleration
 3. Related Rates
- E. The Integral
1. Antiderivatives
 2. Area of a region bounded by a curve above the x-axis, two vertical lines, and the x-axis as a limit of a sum
 3. The fundamental theorem of calculus
 4. Evaluation of definite integrals
 - a. Using antiderivatives and the Fundamental Theorem of Calculus
 - b. Using numerical methods
- F. Exponential and Logarithmic Functions
1. Derivative and integral of the exponential function
 2. Derivative of the natural logarithmic function
 3. Applications
 - a. Exponential growth and decay
 - b. Economic applications