



Syllabus

MAT 271 Calculus I

General Information

Date March 3rd, 2023

Department Mathematics

Course Prefix MAT

Course Number 271

Course Title Calculus I

Course Information

Catalog Description A first course in Calculus focusing on the mathematics of changing rates. The derivative of polynomial and transcendental functions is investigated from a numerical, graphical, and algebraic approach. Applications for the use of derivatives are also explored. Introduction to the definite integral and the Fundamental Theorem of Calculus is included in this course. Graphing calculator required

Credit Hours 4

Lecture Contact Hours 4

Lab Contact Hours 0

Other Contact Hours 0

Grading Scheme Letter

Prerequisites

MAT 152 or Placement into Math Level 4

Co-requisites

None

First Year Experience/Capstone Designation

This course DOES NOT satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

Mathematics (and Quantitative Reasoning)

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Inquiry and Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Understand derivatives as the instantaneous rate of change.
2. Obtain derivatives numerically, algebraically, and graphically.
3. Apply derivatives to solve problems or draw conclusions.
4. Understand and apply the Fundamental Theorem of Calculus

Outline of Topics Covered

1. Review as needed library of functions.
 - a. Linear Functions
 - b. Exponential Functions
 - c. Power Functions
 - d. Inverse Functions
 - e. Logarithmic Functions
 - f. Natural Logarithmic Functions
 - g. Composite Functions
 - h. Trigonometric Functions
 - i. Polynomial and Rational Functions
2. The Derivative
 - a. derivative at a point
 - b. derivative function
 - c. interpretations of the derivative as a rate of change
 - d. relationship between first and second derivatives with respect to behavior of a function
 - e. approximations and local linearity
 - f. limits, continuity and differentiability
3. Formulas for derivative of a:
 - a. constant function
 - b. power function
 - c. polynomial function
 - d. exponential function
 - e. logarithmic function

- f. hyperbolic function
- g. trigonometric function, including inverse trigonometric functions
- 4. Differentiation Techniques
 - a. product and quotient rules
 - b. chain rule and its application
 - c. implicit differentiation
- 5. Applications of the Derivative
 - a. Using the graphs of the first and second derivative to interpret characteristics of the original function.
 - b. finding extrema and inflection points on an interval
 - i. Optimization in problem solving
 - ii. Newton's Method (OPTIONAL)
- 6. The Definite Integral
 - a. interpretations of the definite integral
 - b. definite integral as area and average using Riemann Sums
 - c. Fundamental Theorem of Calculus