

MAT 271 Calculus I

COURSE DESCRIPTION:

Prerequisite(s): MAT 172; minimum grade of "C"

Corequisite(s): None

This course is designed to develop the topics of differential and integral calculus. Emphasis is placed on limits, continuity, derivatives and integrals of algebraic and transcendental functions of one variable. Upon completion, students should be able to select and use appropriate models and techniques for finding solutions to derivative-related problems with and without technology. **Students may not receive credit for both MAT 263 and MAT 271.**

This is a Universal General Education Transfer Component (UGETC) course.

Course Hours Per Week: Class, 3. Lab, 2. Semester Hours Credit, 4.

LEARNING OUTCOMES:

Upon completing requirements for this course, the student will be able to:

1. Apply the definition of limit to evaluate limits by multiple methods and use it to derive the definition and rules for differentiation and integration.
2. Use derivatives to analyze and graph algebraic and transcendental functions.
3. Select and apply appropriate models and differentiation techniques to solve problems involving algebraic and transcendental functions; these problems will include but are not limited to applications involving optimization and related rates.
4. Apply the definition of indefinite integral to solve basic differential equations.
5. Apply the definition of definite integral to evaluate basic integrals.
6. Use the fundamental theorem of calculus to evaluate integrals involving algebraic and transcendental functions.

OUTLINE OF INSTRUCTION:

- I. Limits and Derivatives
 - A. The Tangent and Velocity Problems
 - B. The Limit of a Function
 - C. Calculating Limits Using the Limit Laws
 - D. The Definition of a Limit
 - E. Continuity
 - F. Limits at Infinity; Horizontal Asymptotes
 - G. Derivatives and Rates of Change
 - H. The Derivative as a Function
- II. Differentiation Rules
 - A. Derivatives of Polynomials and Exponential Functions
 - B. The Product and Quotient Rules
 - C. Derivatives of Trigonometric Functions
 - D. The Chain Rule
 - E. Implicit Differentiation

- F. Derivatives of Logarithmic Functions
- G. Rates of Change in the Natural and Social Sciences
- H. Hyperbolic Functions

- III. Applications of Differentiation
 - A. Related Rates
 - B. Linear Approximations and Differentials
 - C. Maximum and Minimum Values
 - D. The Mean Value Theorem
 - E. How Derivatives Affect the Shape of a Graph
 - F. Curve Sketching
 - G. Optimization Problems

- IV. Integrals
 - A. Antiderivatives
 - B. Areas and Distances
 - C. The Definite Integral
 - D. The Fundamental Theorem of Calculus
 - E. Logarithm Defined as an Integral
 - F. Indefinite Integrals and the Net Change Theorem
 - G. The Substitution Rule

REQUIRED TEXTBOOK AND MATERIAL:

The textbook and other instructional material will be determined by the chair/instructor.