# MAT 263 Brief Calculus

**COURSE DESCRIPTION:**
Prerequisite(s): MAT 171
Corequisite(s): None

This course is designed to introduce concepts of differentiation and integration and their applications to solving problems. Topics include graphing, differentiation, and integration with emphasis on applications drawn from business, economics, and biological and behavioral sciences. Upon completion, students should be able to demonstrate an understanding of the use of basic calculus and technology to solve problems and to analyze and communicate results. 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. Calculate limits and verify using graphical, numerical and analytical methods
2. Interpret the derivative as a rate of change
3. Analyze and interpret the derivative of algebraic, exponential, and logarithmic functions
4. Evaluate antiderivatives and definite integrals of algebraic, exponential, and logarithmic functions
5. Apply derivatives and integrals to business, economics, and biological and behavioral sciences contexts
6. Use appropriate technology and communicate results through a variety of media

**OUTLINE OF INSTRUCTION:**
I. The Derivative
  A. The slope of a straight line
  B. The slope of a curve at a point
  C. The derivative
  D. Limits and the derivative
  E. Differentiability and continuity
  F. Some rules for differentiation
  G. More about derivatives
  H. The derivative as a rate of change

II. Applications of the Derivative
  A. Describing graphs of functions
  B. The first and second derivative rules
  C. Curve sketching
  D. Optimization problems
  E. Applications of derivatives to business and economics

III.  Techniques of Differentiation
- A.  The product and quotient rules
- B.  The chain rule and the general power rule
- C.  Implicit differentiation and related rates

IV.  Logarithm Functions
- A.  Exponential functions
- B.  The exponential function $e^x$
- C.  Differentiation of exponential functions
- D.  The natural logarithm function
- E.  The derivative of ln x
- F.  Properties of the natural logarithm function

V.  Applications of the Exponential and Natural Logarithm Functions
- A.  Exponential growth and decay
- B.  Compound interest
- C.  Applications of the natural logarithm function to economics

VI.  The Definite Integral
- A.  Antidifferentiation
- B.  The definite integral and net change of a function
- C.  The definite integral and area under a graph
- D.  Areas in the xy-plane
- E.  Applications of the Definite Integral

VII. Techniques of Integration
- A.  Integration by substitution
- B.  Evaluation of definite integrals

## REQUIRED TEXTBOOK AND MATERIAL:

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