**University of Arkansas – Fort Smith**
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# General Syllabus

# MATH 2403 Survey of Calculus

Credit Hours: 3 Lecture Hours: 3 Laboratory Hours: 0

Prerequisite: MATH 1403 College Algebra or required placement score

Effective Catalog: 2018~2019

## I. Course Information:

### A. Catalog Description

Designed for students in majors other than the natural sciences, especially business and economics. It introduces the basic concepts of differential and integral calculus and their applications to algebraic, exponential, and logarithmic functions that occur in economics and marketing situations. This course does not satisfy degree requirements for mathematics, science, or engineering majors, nor does it satisfy the prerequisite for MATH 2854 Calculus II. (ACTS: 2203)

### B. Additional Description

Students will not receive credit for both Calculus I and Survey of Calculus. Survey of Calculus includes the major ideas of calculus, but does not cover all topics in as much depth as Calculus I. Survey of Calculus emphasizes concepts and applications of calculus to the business world. Calculus I includes all of the topics in Survey of Calculus and requires a trigonometry or precalculus prerequisite.

## II. Student Learning Outcomes

### A. Subject Matter

Upon completion of this course, the student will be able to:

1. Define and describe the derivative algebraically, graphically, and contextually.
2. Approximate the derivative from a formula, table, or graph.
3. Interpret the meaning of the derivative in real-world contexts.
4. Compute the formula of the derivative of functions involving algebraic, exponential, and logarithmic functions.
5. Use first and second derivatives to describe graphs of functions and to describe real- world phenomena.

6. Apply differential calculus to real-world problem solving including optimization, marginal profit, and marginal cost.
7. Define and describe the definite integral of a function algebraically, graphically, and contextually.
8. Approximate the definite integral from a formula, table or graph.
9. Interpret the meaning of the definite integrals in real-world contexts.
10. Compute the formulas for anti-derivatives of functions involving algebraic, exponential, and logarithmic functions.
11. Use the Fundamental Theorem of Calculus to evaluate definite integrals.
12. Apply integral calculus to real-world problem solving including areas, average value, consumer and producer surplus, present and future value, and probability.

**B. University Learning Outcome**

**Communication Skills (written and oral)**
Students will compose coherent documents appropriate to students examining concepts within the Business Calculus field that will describe relationships between such areas as Derivatives and Definite Integrals and their related business applications. Students will effectively communicate orally these relationships in a public setting.

**Analytical Skills**
**Critical Thinking Skills:** Students will identify problems and develop and justify solutions to problems by researching, evaluating and comparing information from varying sources. Students will recognize calculus as a tool for dealing with real world problem.

## III. Major Course Topics

A. Functions and Change
   1. Functions and their representations
   2. Linear models and rates of change
   3. Polynomial, power functions, exponential functions, and logarithmic functions
B. Limits
   1. Definition
   2. Limit laws
   3. One-sided limits
C. Definition and Interpretation of the Derivative
   1. Finding the derivative of a function
   2. Differentiability
   3. Differentiability and continuity
D. Shortcuts to Differentiation
   1. The power rule
   2. The constant multiple rule
   3. The sum rule
   4. The product and quotient rules

E. Applications of Differentiation
    1. Extrema of Functions
    2. The Mean Value Theorem
    3. Concavity and Inflection points
    4. Optimization problems
F. Definition and Interpretation of the Definite Integral
    1. Indefinite integrals
    2. Integration by substitution
    3. Area
    4. The definite integral
G. Fundamental Theorem of Calculus
    1. The first Fundamental Theorem of Calculus
    2. The second Fundamental Theorem of Calculus
H. Applications of Integration
    1. Area between curves
    2. Application to economics
    3. Application to Biology
I. Finding and applying Antiderivatives