College Calculus
Essential Outcomes

The primary purpose of this course is to develop a sound knowledge of derivatives, anti-derivatives and their applications. The following rubric can be used for all learning targets.

4	3	2	1	0
Student has completely **performed the learning targets** without error.	Student has completely **performed the learning targets** with minor errors.	Student has **performed the learning targets** but with major errors	Student has not demonstrated how to **perform the given learning targets** but made an attempt.	No attempt nor direction on possible solution.

A student who successfully completes this course will be able to:

1. Differentiate simple functions using limit definition.
   The student will be able to:
   a. Analyzing the tangent line problem using the difference quotient.
   b. Find the limit of a function graphically and numerically.
   c. Evaluating limits analytically.
   d. Determining continuity using limits.
   e. Evaluating one-sided limits.
   f. Evaluating infinite limits from the left and the right.

2. Differentiate algebraic, trigonometric, exponential and logarithmic functions.
   The student will be able to:
   a. Apply the formal (limit) definition of a derivative.
   b. Apply the basic rules of differentiation to find the derivative of functions.
   c. Find the derivative using the product and quotient rules.
   d. Find higher-order derivatives.
   e. Apply the chain rule to find the derivatives of a composite.
   f. Implicitly differentiate to find the derivatives of complex multi-variable functions.
   g. Differentiate natural logarithmic functions.
   h. Differentiate exponential functions.
   i. Apply differentiation to inverse trigonometric functions.

3. Apply derivatives to real life problems.
   The student will be able to:
   a. Solve real world problems involving related rates.
   b. Solve real world problems through optimization.
   c. Solve real world problems involving Rolle's Theorem.

4. Analyzing graphs of functions showing intercepts and asymptotes, and extrema without using a graphing calculator.
   The student will be able to:
   a. Find critical numbers and determine if they are a relative max or min.
   b. Determine where the function is increasing or decreasing.
   c. Find inflection point and determine if the graph is concaved up or down.
   d. Find the intercepts and determine where the function is positive or negative.

e. Identify lines of asymptotes to describe the end behaviors or infinities.
f. Sketch the graph without the aid of a graphing utility.

5. Integrate anti-derivatives of algebraic, trigonometric, exponential and logarithmic functions.

The student will be able to:

a. Find the anti-derivatives of algebraic and trigonometric functions.
b. Perform integration with the limit process by using Riemann Sums to simplify the limit.
c. Determine the values of definite integrals.
d. Using the Fundamental Theorem of Calculus to solve integrals.
e. Integrate functions by substitution.
f. Apply the Average Value Theorem to solve integrals.
g. Integrate natural logarithmic functions.
h. Integrate Exponential functions.
i. Apply integration to inverse trigonometric functions.
j. Apply integration to hyperbolic functions.
k. Perform integration by parts to solve integrals.

6. Apply Integrals to solve real world problems.

The student will be able to:

a. Apply definite integral to find area and solve other real life problems.
b. Find the area between two curves.
c. Find solids of a revolution.
d. Use the language of mathematics to communicate ideas contained in a problem and its solution.