



**Catholic  
Memorial**  
HIGH SCHOOL

## Year Long Course Plan

**Department: Mathematics**

**Course: Calculus 462/463**

**Essential Learning Outcomes:** After successfully completing this course, students will be able to:

1. Identify, describe, and analyze properties of functions and the relationships among functions
2. Use models to solve mathematical and real-world problems
3. Use technology to plot graphs of functions, determine zeros of a function, determine the derivative of a function at a point and find the value of a definite integral
4. Solve problems graphically, numerically, analytically and verbally and to determine when each method is most appropriate.
5. Organize work and present mathematical procedures and results clearly, systematically, succinctly, and correctly
6. Use reason and logic to evaluate information, perceive patterns, identify relationships, formulate questions, pose problems, and make and test conjectures
7. Demonstrate an understanding of the interrelationship among mathematics, physics, economics and the social sciences
8. Analyze non-routine problems and arrive at solutions by various means
9. Develop effective oral and written presentations employing correct mathematical terminology, notation, symbols, and conventions for mathematical arguments and display of data

<b>Quarter 1</b>	<b>Quarter 2</b>
<p>Unit 1: Functions (ELO 1,2,4,5,6,7)</p> <ul style="list-style-type: none"><li>• Solving and graphing linear functions</li><li>• Solving and graphing exponential functions</li><li>• Solving and graphing logarithmic functions</li><li>• Solving and graphing polynomial functions</li><li>• Solving and graphing trigonometric functions</li><li>• Assessment – Written Test</li></ul> <p>Unit 2: The Derivative (ELO 1,2,3,4,5,6,7,9)</p> <ul style="list-style-type: none"><li>• Evaluating limits numerically, graphically, and algebraically</li><li>• Instantaneous rate of change</li><li>• Determining the derivative/velocity/slope of a curve at a given point</li><li>• Calculating the derivative function, its graph and its interpretation</li><li>• Calculating the second derivative function, its graph and its interpretation</li><li>• Determining the differentiability and continuity of a function</li><li>• Assessment – Written Test</li></ul>	<p>Unit 3: Shortcuts to Differentiation (ELO 1,2,3,4,5,6,7)</p> <ul style="list-style-type: none"><li>• Power Rule</li><li>• Exponential Functions</li><li>• Product and quotient rule</li><li>• Derivatives of Trigonometric Functions</li><li>• Chain Rule</li><li>• Implicit differentiation</li><li>• Parametric equations</li><li>• Assessment – Written Test</li></ul> <p>Unit 4: Applications of derivatives (ELO 1,2,3,4,5,6,7,8,9)</p> <ul style="list-style-type: none"><li>• Using derivatives to determine the characteristics of a graph</li><li>• Using derivatives to solve real life optimization problems</li><li>• Using derivatives to solve problems involving related rates</li><li>• L'Hôpital's rule</li><li>• Assessment – Written Test</li></ul>

<b>Quarter 3</b>	<b>Quarter 4</b>
<p>Unit 5: Key Concept: The Definite Integral (ELO 1,2,3,4,5,6,7)</p> <ul style="list-style-type: none"> <li>• Distance traveled</li> <li>• The definite integral and Riemann sums</li> <li>• The fundamental theorem of calculus and its interpretations</li> <li>• Properties of definite integrals</li> <li>• Assessment – Written Test</li> </ul> <p>Unit 6: Constructing Antiderivatives (ELO 1,2,3,4,5,6,7,8)</p> <ul style="list-style-type: none"> <li>• Antiderivatives graphically</li> <li>• Antiderivatives numerically</li> <li>• Antiderivatives analytically</li> <li>• Differential equations</li> <li>• Second fundamental theorem of calculus</li> <li>• Assessment – Written Test</li> </ul>	<p>Unit 7: Integration (ELO 2,3,4,5,6,7,8)</p> <ul style="list-style-type: none"> <li>• Integration by substitution</li> <li>• Integration by parts</li> <li>• Area between curves</li> <li>• Assessment – Written Test</li> </ul> <p>Unit 8: Using the Definite Integral (ELO 2,3,4,5,6,7,8)</p> <ul style="list-style-type: none"> <li>• Volumes of solids of revolution - washers</li> <li>• Volumes of solids of revolution - shells</li> <li>• Volumes of solids with known cross sections</li> <li>• Assessment – Written Test</li> </ul>