



**Northern York County School District
Curriculum Overview**

Course: Honors Applied Calculus	
Grade Level: 11 - 12	
Approval Date:	Length of Time: 180 days
Course Description: Calculus expands algebraic, geometric, and trigonometric concepts to explore two main concepts: differentiation and integration. Using the limit process, a connection is made linking the concept of linear slope to differentiation, the concept of calculating slopes of non-linear functions, and the derivative. Through this process, students analyze and investigate real-life problems involving rates of change, including those found in business and economics, and physics. The second main concept studied in calculus is that of integration or the antiderivative. Integration reverses the process of differentiation to explore the concept of determining areas under curves. Through integration, students solve real-life problems by calculating areas that cannot be easily calculated using geometric formulas. Using the process of limits as a bridge from previous mathematics courses, this application-based study of calculus utilizes differentiation and integration to solve many real-life problems. Prerequisite: A teacher's recommendation is required along with the completion of a Trigonometry / Advanced Mathematics or Pre-calculus course.	
Course Objectives: <ul style="list-style-type: none">• Solve equations and inequalities.• Evaluate and simplify expressions.• Apply formulas.• Write and graph equations and inequalities.• Determine the domain and range of functions and relations.• Determine limits of a function.• Find derivatives of functions using the limit definition and using various rules.• Use derivatives to analyze functions and to solve real-life applications.• Graph and solve exponential and logarithmic equations.• Find antiderivatives or integrals using various procedures.• Use integrals to solve real-life problems.	
Related Standards: <ul style="list-style-type: none">• CC.2.1.HS.F1 Apply and extend the properties of exponents to solve problems with rational exponents.• CC.2.2.HS.A.14 Apply geometric concepts to model and solve real world problems.• CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.• CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.	

- **CC.2.2.HS.D.5** Use polynomial identities to solve problems.
- **CC.2.2.HS.D.6** Extend the knowledge of rational functions to rewrite in equivalent forms.
- **CC.2.2.HS.D.7** Create and graph equations or inequalities to describe numbers or relationships.
- **CC.2.2.HS.D.8** Apply inverse operations to solve equations or formulas for a given variable.
- **CC.2.2.HS.D.10** Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Units:

- Precalculus Review
- Functions, Graphs, and Limits
- Differentiation
- Applications of the Derivative
- Exponential and Logarithmic Functions
- Integrations and Its Applications
- Techniques of Integration

Concepts:

- **Apply Fundamental Algebraic and Geometric Skills** – Algebraic and geometric skills including solving and graphing linear and nonlinear equations and inequalities, simplifying expressions, applying formulas, using function notation, finding equations of parallel and perpendicular lines, and finding inverse functions are foundational to the understanding of calculus concepts.
- **Finding Derivatives** – One of the main outcomes of the course, students will find derivatives using a variety of rules and methods including using the limit definition, using the Power, Product, Quotient and Chain rules, and using implicit differentiation.
- **Using Derivatives to Solve Application Problems** – Derivatives can be used to find instantaneous rates of change, marginals, and to solve related rate and optimization problems. Derivatives also play an important role in determining the continuity of a function and analyzing the graph of a function.

Competencies:

- Simplify and evaluate expressions.
- Solve equations and inequalities.
- Write equations to model various scenarios.
- Use formulas appropriately and in context.
- Use a variety of methods to find the derivatives of functions and explain their meaning.
- Use derivatives to solve real-life problems.
- Solve exponential and logarithmic equations.
- Use a variety of methods to find integrals and explain their meaning.
- Use integrals to solve real-life problems.

<ul style="list-style-type: none"> • Exponential and Logarithmic Model – Students will explore the use of exponential and logarithmic functions for modeling real-life situations and will explore the process of finding derivatives of both types of functions. • Finding Integrals – Students will find the antiderivatives or integrals of functions using multiple methods including use of the General Power Rule, u-substitution, and integration by parts. 	
Learning Activities: <ul style="list-style-type: none"> • Warm Up Problems • Direct Instruction • Class Discussions • Collaboration Activities • Technology Activities • Guided Practice • Independent Practice 	Performance Tasks: <ul style="list-style-type: none"> • Quizzes • Unit Test • Unit Activities • Unit Projects
Other Assessment Measures: <ul style="list-style-type: none"> • Homework • Classwork • Presentations • AP exam 	
Textbook/Primary Resource: Larson, Calculus an Applied Approach 10 th Edition	
Supplemental Resource Materials: <ul style="list-style-type: none"> • District / Teacher Created Resources • Online Resources 	