Department: Mathematics
Course Name: Advanced Placement Calculus

Course Description:
Roughly equivalent to both first and second semester college calculus courses, this course covers Calculus AB and could extend the content to different types of equations and introduces the topic of sequences and series. The AP course covers topics in differential and integral calculus, including concepts and skills of limits, derivatives, definite integrals, the Fundamental Theorem of Calculus, and series. The course teaches students to approach calculus concepts and problems when they are represented graphically, numerically, analytically, and verbally, and to make connections among these representations. Students learn how to use technology to help solve problems, experiment, interpret results, and support conclusions. An emphasis on critical thinking, complex communication, collaboration, creativity, and risk-taking while promoting a global perspective will prepare students for rigorous college work. Students are required to take the AP Calculus exam in the spring. A TI-84 graphing calculator is required.

Content:
Limits and continuity
Differentiation: definition and fundamental principles
Differentiation: composite, implicit, and inverse functions
Contextual applications of differentiation
Analytical applications of differentiation
Integration and accumulation of change
Differential equations
Applications of integration
Parametric equations, polar coordinates, and vector-valued functions (BC only)
Infinite sequences and series (BC only)

Skills:
Mathematical Practices:
- Identify the question to be answered or problem to be solved
- Identify key and relevant information to answer a question or solve a problem
- Identify an appropriate mathematical rule or procedure
- Apply appropriate mathematical rules or procedures, with and without technology
- Explain how an approximated value relates to the actual value

Connecting Representations:
- Identify common underlying structures in problems involving different contextual situations
- Identify mathematical information from graphical, numerical, analytical, and/or verbal representations
- Identify a re-expression of mathematical information presented in a given representation
- Identify how mathematical characteristics or properties of functions are related
- Describe the relationships among different representations of functions and their derivatives

Justification:
- Apply technology to develop claims and conjectures
- Identify an appropriate mathematical definition, theorem, or test to apply
- Confirm whether hypotheses or conditions of a selected definition, theorem, or test have been satisfied
- Apply an appropriate mathematical definition, theorem, or test
- Provide reasons or rationales for solutions and conclusions

Explain the meaning of mathematical solutions in context.
Confirm that solutions are accurate and appropriate

Communication and Notation:
Use precise mathematical language
Use appropriate units of measure
Use appropriate mathematical symbols and notation
Use appropriate graphing techniques
Apply appropriate rounding procedures

Text and Materials:
Finney, Demana, Waits, Kennedy, Bressoud, Calculus: Graphical, Numerical, Algebraic (AP Edition, Pearson, 5th ed., 2016)
AP Calculus Course At-A-Glance

Methods of Instruction:
Lecture
Small group discussion
AP Classroom videos,
AP Classroom progress checks
Worksheets
Homework assignments
Desmos

Methods of Evaluation:
Tests
Quizzes
Online assessments