Montclair High School
Course Syllabus

Department: **Mathematics**
Course: **AP Calculus BC**
Level: **Advanced Placement at High School**
Credits: **5 Credits**

Course Description:
This is a college level calculus course for which most colleges grant advanced placement and credit. The course follows the advanced placement syllabus as established by the College Board and will prepare the student to take the Advanced Placement Examination in Calculus BC. The basic emphasis of the course is differential calculus through the use of limits and differentiation formulas, integral calculus through the use of summations and integration formulas, analytic geometry, parametric equations, and infinite series.

Standards:
As per College Board

Anchor Text(s):

Text Title	Publisher/Author	Year/Edition	ISBN	Text Distribution
Calculus: Graphical, Numerical, Algebraic	Pearson Prentice Hall/Finney, Demana, Waits, & Kennedy	2007/3rd Edition (AP Edition)	0-13-201408-4	Hardcopy
Calculus & Analytical Geometry	Varberg	1991/8th Edition	0-13-081137-8	Hardcopy

Supplementary Materials:
Graphing Calculator required (TI-83 Plus, TI-84, TI-84 Plus strongly recommended)
Material supplied by publisher
Teacher prepared worksheets/handouts

Units of Study:
- Graph analysis, including asymptotes and unbounded behavior
- Limits of functions, including one-sided limits and limits at infinity
- Continuity
- Derivatives and their applications
- Integrals and their applications
- Transcendental functions
- Polynomial approximations and infinite series, including Taylor and Maclaurin

Proficiencies:

By the end of this course, students will:

- Analyze graphs, with and without the graphic calculator, and explain the local, global, and asymptotic behavior of a function, including piecewise-defined functions, trigonometric, logarithmic and exponential functions.
- Calculate and estimate limits, including one-sided limits and limits at infinity.
- Use knowledge of the limit to discuss the continuity of a function.
- Understand the concept of the derivative and its definitions, and be able to describe it graphically, numerically, and analytically.
- Apply the differentiation formulas, implicit differentiation, and the chain rule.
- Apply derivatives to problem-solving, including related rates, differentials, velocity, acceleration, optimization problems, higher-order derivatives, and curve-sketching.
- Solve problems using the Mean Value Theorem and Rolle's Theorem.
- Understand the concept of an integral using a Riemann sum.
- Understand the basic properties of an indefinite integral and a definite integral.
- Apply the integral to problem-solving, including area under a curve or between two curves, volume of a solid of revolution, distance traveled along a straight line.
- Solve first order differential equations.
- Understand the concept of logarithmic, exponential, trigonometric and inverse trigonometric functions, and the derivatives and integrals of these functions.
- Solve problems using the trapezoidal rule and the average value of a function.
- Analysis of planar curves given in parametric form, polar form, and vector form, including velocity and acceleration vectors.
- Find derivatives of parametric, polar, and vector functions.
- Geometric interpretation of differential equations via slope fields, and the relationship between slope fields and solutions curves for differential equations.
- Find numerical solutions of differential equations using Euler's method.
- Apply L'Hopital's Rule, including its use in determining limits and convergence of improper integrals and series.
- Find antiderivatives by substitution of variables, integration by parts, integration by partial fractions.
- Work with series of constants, including geometric, harmonic, and alternating with error bound.
- Know terms of series as areas of rectangles and their relationship to improper integrals, including the integral test and its use in testing the convergence of series.
- Apply the ratio test and the comparison test for convergence.
- Know the Taylor and Maclaurin series.
- Know the Taylor approximation to a function and the LaGrange error bound.
- Know how to manipulate Taylor series, including differentiation and integration.
- Know functions defined by power series and radius and interval of convergence.

Evaluation & Assessment:

- Tests 60%
- Quizzes 30%
- Homework 10%