

Walter Payton College Prep
AP Calculus BC Course Outline

Textbook: Calculus from Graphical, Numerical, and Symbolic Points of View (Ostebee & Zorn)

For more information of the College Board's AP Calculus AB learning objectives see the College Board website: <https://apstudent.collegeboard.org/apcourse/ap-calculus-bc>

All of the topics in AB Calculus are included in BC Calculus; additional topics include Taylor Series, Parametrics as well as polar Equations, Vectors, L'Hospital's Rule, Euler's Method and Improper Integrals. The outline for this course, AP Statistics and AB Calculus is available through the College Board's website (collegeboard.com). All students will be expected to take the AP exam in May, for which many colleges will grant *two* semesters of Calculus credit.

1st Semester: Continuity, Limits, Derivatives with Applications, Integrals, and The Fundamentals Theorem of Calculus.

2nd Semester: Approximation and Series, Taylor Series, Improper Integrals, Vector Calculus, Calculus in Polar

Quarter 1:

Topics:

- Elementary functions from a graphical and algebraic perspective
- The derivative of functions from a graphical perspective
- The derivative function from a numeric perspective using the TI nspire.
- Justifying derivative functions derived graphically
- Conjecturing and testing antiderivatives
- Solving Differential Equations and Initial Value Problems
- Special derivative rules of the elementary functions.
- Evaluating limits that are disguised derivatives
- Finding derivatives of products, quotients, and composite functions.
- Implicit differentiation
- Derivatives of inverse trigonometric functions

Quarter 2:

Topics:

- L'Hospital's Rule
- Slope fields
- Euler's Method
- Solving DEs using separation of variables
- Optimization
 - The fun Snell's law fish tank demo goes here
- Parametric derivatives
- Related Rates
- Intro to Taylor series
- Intermediate Value Theorem
- Mean Value Theorem
- Area functions and integrals
- Fundamental Theorem of Calculus
- Substitution method of integration

Quarter 3:

Topics:

- Riemann Sums and area approximations
- Arc length, areas, and volumes
- Vector-valued functions
- Polar coordinates and their derivatives
- Integration techniques: by parts and partial fractions
- Taylor Polynomials and the Lagrange error bound analysis.
- Improper Integrals: comparison and p-tests

Quarter 4:

Topics:

- Sequences and series
- Tests of convergence; absolute versus conditional convergence
- Power series as functions