

# AP Calculus AB and BC Course Expectations

Expectations are high in this college level accelerated Calculus course. You will learn how to analyze, synthesize, and extend the concepts of calculus as well as justify your answers both analytically and graphically. Written justification of answers will also be required using complete sentences, accurate mathematical vocabulary, and precision in analytical methods.

Understanding the material, problem solving/critical thinking skills and persistence are further expectations as well as applications of Calculus concepts is essential to success on the AP Calculus AB and BC tests; simple rote memorization skills will not be sufficient. **Calculus follows a sequential path of knowledge that must be mastered and retained and builds on your prior developed skills from Integrated Math 1 through Pre-Calculus.** All students enrolled in AP Calculus AB and BC are expected to take the Advanced Placement Exam given in May; this includes a commitment on your part to be motivated and responsible to do ALL assigned work without excuses.

Students successfully completing the Advanced Placement Exam may receive credit at many colleges and Universities. Please check with the colleges that you are applying to what are the specific requirements for credit. (At UCLA a 4 is required for credit in AP Calculus AB and BC, but at UCR a 3 is required for credit) You can Google – “AP College Board,” select “Credit and Placement,” then input college desired and the AP credit policies for each University can be seen.

Preparation for the AP Test will include a balance between memorizing rules, understanding the concepts, and using a graphing calculator. When a graphing calculator can be used, you must also know how to perform the calculations algebraically as the AP test is split into many sections. Also, even though the AP test requires the use of a graphing calculator, many colleges and Universities will not allow you to use graphing calculators in their courses. Therefore, to prepare you not only for the AP test but also for success in college, you must be able to understand and analyze concepts both analytically as well as graphically.

The AP Calculus AB and BC tests follow the same format: 3 hours and 15 minutes and is composed of 45 multiple-choice questions and 6 free response questions.

## **The multiple-choice section is broken down as follows:**

30 questions in 55 minutes – no calculators allowed

15 questions in 50 minutes – calculator required

## **The free response section is broken down as follows:**

2 problems in 30 minutes – calculator required

4 problems in 60 minutes – no calculator allowed

**ATTENDANCE** is crucial to success, therefore vacations, appointments, or other reasons to be absent **MUST** be minimized for success, not only to achieve in the class, but also to receive a passing score on the AP exam.

**PRIOR KNOWLEDGE** is essential to success, on the back is a list of some of the topics that you need to know, otherwise regular Calculus might be a better fit. Otherwise, you will need to be able invest the time to come in for extra assistance which will gladly be given.

**ALL STUDENTS ARE EXPECTED TO TAKE THE AP EXAM** given in May. As this is an advanced placement course, **attendance each day** is essential towards achieving a passing score on the AP exam. Frequent absences will place the student at a disadvantage on the AP exam.



# AP Calculus AB and BC Course Descriptions

Below is a list of the topics covered in AP Calculus AB as well as AP Calculus BC

AP Calculus AB learns the standards listed that do not have asterisks (\*\*\*)

AP Calculus BC learns ALL of the standards listed.

The difference in Calculus AB and Calculus BC can be seen at a glance by the asterisks. AP Calculus BC is an accelerated paced course and requires perseverance, precision in vocabulary, articulate work, and **understanding concepts – not memorizing procedures.**

## FUNCTIONS, GRAPHS, AND LIMITS

Analysis of graphs  
Limits of functions (including one sided limits)  
Asymptotic and unbounded behavior  
Continuity as a property of functions  
Trigonometric functions and their graphs  
Parametric, polar, vector functions \*\*\*

## DERIVATIVES

Concept of the derivative  
Derivative at a point  
Derivative as a function  
Higher order derivatives  
Applications of derivatives  
    Related Rates  
    Optimization  
    Curve Sketching  
    Economics  
Computation of derivatives  
Slope Fields  
Parametric, polar, vectors functions \*\*\*  
Slope Fields  
Euler's method \*\*\*  
L'Hopital's Rule \*\*\*

## INTEGRALS

Riemann Sums  
Interpretations and properties of definite integrals  
Applications of Integrals  
1<sup>st</sup> and 2<sup>nd</sup> Fundamental Theorems of Calculus  
Techniques of antidifferentiation and integration  
Antidifferentiation by substitution  
Antidifferentiation by parts \*\*\*  
Antidifferentiation by partial fractions \*\*\*  
Improper integrals \*\*\*  
Applications of antidifferentiation and integration  
Numerical approximations of definite integrals \*\*\*  
Volumes of Revolutions including solids with known cross sections  
Logistic Differential Equations \*\*\*

## POLYNOMIAL APPROXIMATIONS & SERIES

Geometric series \*\*\*  
Harmonic series \*\*\*  
Alternating series \*\*\*  
p-series \*\*\*  
Taylor series \*\*\*  
Taylor polynomials \*\*\*  
Maclaurin series \*\*\*  
Power series \*\*\*  
Convergence and Divergence \*\*\*  
Radius of Convergence \*\*\*  
Comparison Test \*\*\*

**NOTE:** Students taking AP Calculus BC directly from Pre-Calculus Honors should be receiving an "A" in Pre-Calculus Honors. Students in Pre-Calculus Honors receiving a B or C should take AP Calculus AB. Students in regular Pre-Calculus should not accelerate into AP Calculus BC. Students in regular Pre-Calculus that are doing well could choose AP Calculus AB.

**PRIOR KNOWLEDGE** is essential in Calculus AB and BC, time does not exist to continually reteach prior concepts from PreCalculus, Trigonometry, Integrated Math 1, 2 and 3. The willingness and time to come in for extra assistance when prior math concepts have not been mastered is essential.