AP Calculus AB/BC

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Alliance College-Ready
Academy High School #16

"The difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather a lack of will."
Vince Lombardi

CLASS GOALS: 80% of students will pass the AP Calculus AB test with a score of 3 or higher.

COURSE DESCRIPTION:

This yearlong course is equivalent to a one-semester college course in Calculus. Students will explore the following topics: functions and their graphs, limits and continuity, the derivative and its applications, definite and indefinite integrals, and logarithmic, exponential, and trigonometric functions. The course is intended for students who have a thorough knowledge of algebra, geometry, trigonometry, and analytic geometry, and who both enjoy and seek a challenge that will help them grow as mathematical thinkers. The graphing calculator will be used extensively to help students gain an insight into the principles of calculus and the relationships among the graphical, algebraic and numerical representations of concepts.

COURSE OUTLINE:

This course will consist of six main units in which students will continuously build on prior knowledge to investigate an essential unit question. Each unit will conclude with a summative test that is designed to reflect the rigor and expectations of a college-level course. Units include:

0. **Functions** - How do transformations on parent graphs compare to one another and how can one rewrite an absolute value function as a piecewise function?

1. **Limits and Continuity** - How can one evaluate limits algebraically, numerically and graphically? How can continuity be expressed in terms of limits and how can asymptotes help us better understand limits to infinity?

2. **Derivatives** - What is the definition of a derivative in terms of limits? How are a graph's tangent line at a point and its derivative related and what is the relationship between differentiability and continuity of a function?

3. **Applications of Derivatives** - What does the graph of a function's derivative represent? Can we construct a graph of a function when given the graph of its derivative and one solution? What is optimization in terms of a graph's absolute and local extrema?

4. **Integrals** - What can integration help me calculate in a function's graph? How are derivatives and integrals related?

5. **Applications of Integrals** - What is the difference between Average Value Function and the Average Rate of Change? What is implied by "rate of change" when describing a graph? What is implied by "average" when describing a graph?

6. **Differential Equations** - How can one apply derivative and integration rules to separable differential equations? How are slope fields and solution curves for differentiable equations related?

BC - *In addition to addition to the topics above, Students enrolled in AP Calculus BC will also be covering the following material near simultaneously.*

1. **Parametric, Vector and Polar Functions** - How do vectors, polar functions and parametric functions relate? How do vectors, polar functions and parametric functions help us understand motion that does not travel in a straight line?

2. **Sequences** - How can L'Hopital's Rule help to calculate limits of fractions whose numerators and denominators both approach zero or are unbounded? How can L'Hopital's rule help to compare the rates at which functions grow as x becomes large?

3. **Infinite Series** - How do limits and the convergence and divergence of a series relate?How can our TI-83s help us understand the approximation process of elementary series?

COURSE TEXTS:

Major course practices and homework will be drawn from the following sources:

- Finney, Ross L., Franklin Demana, Bert Waits, and Daniel Kennedy. Calculus: Graphical, Numerical, Algebraic, 3rd ed. Addison-Wesley Longman, 2007.
- Larson, Ron, Edwards, Bruce. Calculus of a Single Variable, 10th ed. Brooks/Cole, 2014.

INSTRUCTIONAL GOALS AND ROUTINES: ***solishs16.weebly.com***

Most all of our resources can be found on our class website. We will work extensively with graphing calculators and our assessments will be designed so that students become proficient with and without the device. Each lesson is designed to allow us to practice new skills and conceptually understand the reasoning behind them. Each lesson cycle will follow the pattern below

LAUNCH → EXPLORE → SUMMARIZE → SHARE

GRADING POLICY:

TBD

REQUIRED MATERIALS:

Every day, students must have
1. A pocket folder
2. Two spiral notebooks
    a. Notes
    b. Practice
3. Writing utensil (pencil is preferred)

CLASSROOM EXPECTATIONS:

1. Be on time. On time means in your seat working when the bell rings. Every minute of class time is valuable!!

2. Come to class every day with a pencil and your class folder. You may keep your folder in class (except when needed for studying at home).

3. **NO** food or drinks. Bottled water is the only exception.

4. Cell phones and music playing devices **MUST** be put away at all times during class.

5. Be positive; have a good attitude.

6. Respect your teacher and classmates. We are a team. Look out for each other.

7. Work hard! Like anything worth doing, success in this class and the upcoming AP test is going to take work!