

# AP Calculus BC - Syllabus

**Teachers:** Mr. Evans and Ms. Ashley

**Emails:** [mark.evans@hcps.org](mailto:mark.evans@hcps.org) and [sarah.ashley@hcps.org](mailto:sarah.ashley@hcps.org)

**Webpage:** [www.scienceandmathacademy.com/academics/calculus\\_bc/](http://www.scienceandmathacademy.com/academics/calculus_bc/)

**Text:** Larson, R., & Edwards, B. H. (2010) *Calculus* (9<sup>th</sup> ed.). Belmont, CA: Brooks/Cole Cengage Learning.

**Classroom:** B310 & B302

**Course Description:** This course is equivalent to a typical second semester college Calculus course. Topics covered will be a review of Calculus AB (limits, derivatives and their applications, and integrals and their applications), further integration techniques, infinite series, conics, parametric equations, polar coordinates, and vectors.

**Course Objectives and Goals:** Our goal is to prepare students to be successful on the AP Calculus BC exam. To achieve this goal, students will gain a thorough understanding of the topics covered in the course outline (typical Calculus 2 course in college).

**AP Exam:** The exam will be Tuesday morning on May 15<sup>th</sup>. It is expected that all students taking the course will be taking the test.

**Course Outline:** The following is an outline of the topics we will cover and a rough estimate of time we will spend on each chapter.

## Review of Previous Calculus Topics

Time: 10 days

- Limits and Their Properties (Chapter 1)
- Differentiation (Chapter 2)
- Application of Differentiation (Chapter 3)
- Integration (Chapter 4)
- Logarithmic, Exponential, and other Transcendental Functions (Chapter 5)
- Application of Integration (Chapter 7)

## Differential Equations (Chapter 6)

Time: 7 days

- Slope Fields and Euler's Method
- Differential Equations: Growth and Decay
- Separation of Variables and the Logistic Equation
- First-Order Linear Differential Equations

## Integration Techniques, L'Hôpital's Rule, and Improper Integrals (Chapter 8)

Time: 10 days

- Basic Integration Rules
- Integration by Parts
- Trigonometric Integrals
- Trigonometric Substitution
- Partial Fractions
- Indeterminate Forms and L'Hôpital's Rule
- Improper Integrals

### **Infinite Series (Chapter 9)**

Time: 20 days

- Sequences
- Series and Convergence (Geometric Series included)
- The Integral Test and  $p$ -Series
- Comparisons of Series
- Alternating Series
- The Ratio and Root Tests
- Taylor Polynomials and Approximations (Lagrange error bound included)
- Power Series
- Representation of Functions by Power Series
- Taylor and Maclaurin Series

### **Conics, Parametric Equations, and Polar Coordinates (Chapter 10)**

Time: 15 days

- Plane Curves and Parametric Equations
- Parametric Equations and Calculus
- Polar Coordinates and Polar Graphs
- Area and Arc Length in Polar Coordinates

### **Vectors and the Geometry of Space (Chapter 11)**

Time: 15 days

- Vectors in the Plane
- Space Coordinates and Vectors in Space
- The Dot Product of Two Vectors
- The Cross Product of Two Vectors in Space

### **Vector-Valued Functions (Chapter 12)**

Time: 6 days

- Vector-Valued Functions
- Differentiation and Integration of Vector-Valued Functions
- Velocity and Acceleration
- Tangent Vectors and Normal Vectors
- Arc Length and Curvature

### **AP Review**

Time: At least 6 days (Normally the full month before the test.)

- We will try many free-response and multiple-choice questions from previous AP Calculus tests
- We will review all previously covered topics

### **Post AP Calculus Exam**

- Cylindrical and Spherical Coordinates
- Topics of Multivariate Calculus

### **Grading:**

- **Daily Quizzes:** There will be a daily quiz most days. It will consist of 3 questions and will be completed independently at the beginning of the period. Each quiz will be worth 9 points and the top 10 (less if warranted) quizzes in a quarter will be counted.

- Tests: There will be a test at the conclusion of each chapter. Each test will be worth 100 points. There will be a non-calculator section and calculator section to every test.
- Recall quizzes: There will not be many regular quizzes. When we do have a quiz it will be worth approximately 25 points. Quizzes will typically be for recall or basic calculus or algebra (differentiation rules, integration rules, trigonometry properties, elementary series, convergence/divergence, etc.).
- Homework: Homework will be assigned every day. Homework will not be graded each class. Homework will become the major portion of the fourth quarter, when we are reviewing for the AP exam.
- Other assignments as deemed necessary.

**Note:** Mr. Evans reserves the right to change grading policies as seen fit.

### **Calculators:**

“The use of a graphing calculator in AP Calculus is considered an integral part of the course. Students should be using this technology on a regular basis so that they become adept at using their graphing calculators. Students should also have experience with the basic paper-and-pencil techniques of calculus and be able to apply them when technological tools are unavailable or inappropriate.” (Excerpt taken from the CollegeBoard, Calculus Course Description.)

You must have a graphing calculator that fits the following requirements (preferably a TI-84 or TI-nspire.)

- Plot the graph of a function within an arbitrary viewing window
- Find the zeros of functions (solve equations numerically)
- Numerically calculate the derivative of a function, and
- Numerically calculate the value of a definite integral.

### **Classroom Expectations:**

- Be on time. Sharpen your pencil if necessary and get in your seat before the bell rings. If you are not in your seat when the bell rings, you are late. The daily quiz starts immediately.
- Be prepared for class. Bring a pencil, notebook, calculator, and book.
- You will not be permitted to go to your locker during class.
- Use of the bathroom is a privilege that is allowed at the discretion of teachers. You will be permitted to use the restrooms nearest the classroom only.
- Make up work will be given for excused absences only. You will be allowed to make-up missed work according to the HCPS policy. It is your responsibility to see the teacher for the assignment.
- All work must be on time to be accepted for credit. Field trips, rehearsals, or any other absences known in advance are not an excuse for late work. Submit it early or give it to a classmate to submit it for you.
- Students may only use a computer when directed by the teachers.