**Nipomo High School 2014-2015 AP Calculus AB & BC Syllabus**

**Mr. Thorshov**  
E-mail: [sthorshov@lmusd.org](mailto:sthorshov@lmusd.org); Texting: 805-235-2134  
Period 1 - Room 137

**Primary Text**: Building Java Programs – A back to basics approach 3rd ed. Reges & Stepp

Welcome to students with the desire to elevate their problem solving and programming skills.

To provide a balance learning experience course topics will be supported using the following four strategies.

• Numerical analysis (where data points are known, but not an equation)

• Graphical analysis (where a graph is known, but not an equation)

• Analytic/algebraic analysis (traditional equation and variable manipulation)

• Verbal/written methods of representing problems. (Mathematical literacy)

The course is paced to support the mastery of the topics and provide ample opportunity to prepare for the Advanced Placement Exam in May. Students who perform well can earn credit at Universities and Colleges and this goal will be highly supported by a course that adheres to the best practices recommended by College Board.

**Course Requirements:** The AP Exam requires the use of graphing calculators with the ability to perform numeric integration. Students are recommended to acquire a TI-84 calculator for this course as a wide variety of techniques will be specifically modeled and instructed for this device.

Our class will operate and perform with a higher degree of achievement as we work together as a team. Team members lead by example, encourage and share both their joys and pains with one another. Students will need to dedicate significant time outside of class and I will facilitate opportunities for collaboration by arranging study sessions. Careful consideration will be made in an attempt to accommodate the busy schedules of students.

All students are expected to register and complete the AP Exam in May. See the NHS AP coordinator concerning any questions relating to this policy.

**Grading:**   
Exams: 90% Homework and Participation: 10% (Homework will be graded against the rubric on back.)

Expect exams every 2-3 weeks. Students are able to retest twice with capped scores of 90% for the first retake and 80% for the second provided all unit homework is completed and the students pass an online corrective.

**AP Practice Exams:**

First and second semester grades are calculated independently. You will take a minimum of 3 practice tests during the spring semester. These tests will be scheduled in class, after hours and on weekends. Your one or two best performances on these practice tests will be entered in the gradebook and prorated according to your adjusted AP score ( 1-50%, 2-60%, 3-70%, 4-80%, 5-90% ). These practice test grades will represent a maximum of 40% of your second semester grade.

**Rules: 1) Respect yourself, peers, and learning environment. 2) No Electronics. 3) No Food**

**Communication:**I will be utilizing Remind101.com’s texting services to communicate with students.

To sign up text @nhsapcalc to (805) 491-4195.

I have reviewed and understand the syllabus: (Student Signature) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_

**Course Outline  
*BC topics will be appropriately scheduled in.***

**Unit 1: Pre-calculus Review**

1. Exponential and logarithmic functions
   1. Logarithmic functions
   2. Properties of logarithms
   3. Exponential growth and decay
2. Trigonometric functions
   1. Special angles
   2. Graphs of basic trigonometric functions
      1. Domain and range
      2. Transformations
      3. Inverse trigonometric functions
   3. Applications

**Unit 2: Functions, slopes and lines.**

1. Lines
   1. Slope as rate of change
   2. Parallel and perpendicular lines
   3. Equations of lines
2. Functions and graphs
   1. Functions
   2. Domain and range
   3. Families of functions
   4. Piecewise functions
   5. Composition of functions

**Unit 3: Limits and Continuity**

1. Rates of change
2. Limits at a point
   1. Properties of limits
   2. Two-sided
   3. One-sided
3. Limits involving infinity
   1. Asymptotic behavior
   2. End behavior
   3. Properties of limits
   4. Visualizing limits
4. Continuity
   1. Continuous functions
   2. Discontinuous functions
      1. Removable discontinuity
      2. Jump discontinuity
      3. Infinite discontinuity
5. Instantaneous rates of change

**Unit 4: The Derivative**

1. Definition of the derivative
2. Differentiability
   1. Local linearity
   2. Numeric derivatives using the calculator
   3. Differentiability and continuity
3. Derivatives of algebraic functions
4. Derivative rules when combining functions
5. Applications to velocity and acceleration
6. Derivatives of trigonometric functions
7. The chain rule
8. Implicit derivatives
   1. Differential method
   2. *y’* method
9. Derivatives of inverse trigonometric functions
10. Derivatives of logarithmic and exponential functions

**Unit 5: Applications of the Derivative**

1. Extreme values
   1. Local (relative) extrema
   2. Global (absolute) extrema
2. Using the derivative
   1. Mean value theorem
   2. Rolle’s theorem
   3. Increasing and decreasing functions
3. Analysis of graphs using the first and second derivatives
   1. Critical values
   2. First derivative test for extrema
   3. Concavity and points of inflection
   4. Second derivative test for extrema
4. Optimization problems
5. Linearization models
6. Related rates

**Unit 6: The Definite Integral**

1. Approximating areas
   1. Riemann sums
   2. Trapezoidal rule
   3. Definite integrals
2. The fundamental theorem of calculus (part 1)
3. Definite integrals and antiderivatives
   1. The average value theorem
4. The fundamental theorem of calculus (part 2)

**Unit 7: Differential Equations and Mathematical Modeling**

1. Antiderivatives
2. Integration using *u*-substitution
3. Separable differential equations
   1. Growth and decay
   2. Slope fields
   3. General differential equations

**Unit 8: Applications of Definite Integrals**

1. Summing rates of change
2. Particle motion
3. Areas in the plane
4. Volumes
   1. Volumes of solids with known cross sections
   2. Volumes of solids of revolution
      1. Disk method
      2. Shell method

**AB Begins REVIEW, BC Begins Unit 9**

**Unit 9: BC - Polynomial Approximations and Series**

1. Geometric series with applications
2. The harmonic series
3. Alternating series with error bound
4. Convergence Tests
5. Taylor polynomial approximation with graphical demonstration of convergence (for example, viewing graphs of various Taylor polynomials of the sine function approximating the sine curve)
6. Maclaurin series and the general Taylor series centered at x = a
7. Maclaurin series for the functions
8. 
9. Formal manipulation of Taylor series and shortcuts to computing Taylor series, including substitution, differentiation, antidifferentiation, and the formation of new series from known series
10. Functions defined by power series
11. Radius and interval of convergence of power series
12. Lagrange error bound for Taylor polynomials

**AB REVIEW**

**Practice Tests**

**AP Test**

**Unit 10: Calculus Topics and History of Mathematics**