Course Name: AP Calculus

This course will teach The Calculus as outlined in the Advanced Placement (AP) Curriculum. The following are taken from the handbook given at the Advanced Placement Program Professional Development for Calculus (2003-2004).

**Identification of Students** - The prerequisites for the student are basically twofold:

1. The student should have completed a full precalculus mathematics curriculum (usually consisting of three years of algebra/geometry and one year of elementary functions/analytic geometry). This particular prerequisite has always made AP Calculus a little unusual, as it establishes our AP course as a true “fifth-year” course. [*Your instructor can give you a list of the actual topics AP assumes to have been covered in these classes.*]
2. The student should be motivated to do college level work in high school. It is not a good idea to take a “warm-up calculus course” in high school so that the college calculus course will be easy, as this sort of motivation compromises both the high school course and the college course. Students should be studying calculus to learn calculus, and when they learn it they should move on. That premise is the foundation of an Advanced Placement course.

**Philosophy**: Calculus AB and Calculus BC are primarily concerned with developing the students’ understanding of the concepts of calculus and providing experience with its methods and applications. The courses emphasize a multirepresentational approach to calculus, with concepts, results, and problems being expressed geometrically, numerically, analytically, and verbally. The connections among these representations are also important.

Calculus BC is an extension of Calculus AB rather than an enhancement; common topics require a similar depth of understanding. Both courses are intended to be challenging and demanding.

Broad concepts and widely applicable methods are emphasized. The focus of the courses is neither manipulation nor memorization of an extensive taxonomy of functions, curves, theorems, or problem types. Thus, although facility with manipulation and computational competence are important outcomes, they are not the core of these courses.

Technology should be used regularly by students and teachers to reinforce the relationships among the multiple representations of functions, to confirm written work, to implement experimentation, and to assist in interpreting results.

Through the use of the unifying themes of derivatives, integrals, limits, approximation, and applications and modeling, the course becomes a cohesive whole rather than a collection of unrelated topics. These themes are developed using all the functions listed in the prerequisites.

**Goals**:

1. Students should be able to work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.
2. Students should understand the meaning of the derivative in terms of a rate of change and local linear approximation and should be able to use derivatives to solve a variety of problems.
3. Students should understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change and should be able to use integrals to solve a variety of problems.
4. Students should understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
5. Students should be able to communicate mathematics both orally and in well-written sentences and should be able to explain solutions to problems.
6. Students should be able to model a written description of a physical situation with a function, a differential equation, or an integral.
7. Students should be able to use technology to help solve problems, experiment, interpret results, and verify solutions.
8. Students should be able to determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
9. Students should develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

AB Topics: Limits, Derivatives, Applications of the Derivative, Integration, Transcendental Functions, Applications of Integration, Differential Equations, and Slope Fields

BC Topics: Limits (covered in Pre-Calc), Derivatives (covered in Pre-Calc), Applications of the Derivative, Integration, Transcendental Functions, Applications of Integration, Integration Techniques, L’Hopital’s Rule, Improper Integrals, Series and Sequences, Derivatives and Integrals of Parametric Equations, Derivatives and Integrals of Polar Equations, Derivatives and Integrals of Vector-Valued Functions, Differential Equations, Slope Fields, and Logistic Models.

The following was part of the letter confirming the course’s AP designation in Spring ’07

What Does Authorization Mean?  
The authorization of your course is an official recognition by the College Board that your course meets or exceeds the expectations colleges and universities have for your AP subject. Your syllabus was reviewed by experienced college and university faculty, who have confirmed that it outlines how your course provides a college-level learning opportunity to students. This authorization grants your school permission to use the "AP" designation on students' transcripts in association with the authorized course. In addition, your course will appear in a publicly-available ledger to be published on the Web in November 2007.

Grading:

Tests/quizzes – 90% Project – 10%

100-70 A 64-60 B+ 49-45 C+ 34-30 D+ 19-0 F

69-65 A- 59-55 B 44-40 C 29-25 D

54-50 B- 39-35 C- 24-20 D-