AP Calculus – AB
Course Year 2009-2010

Course Overview :

The AP Calculus –AB course is a one semester college course. It is designed for the mathematically gifted high school student who is motivated to excel in this field. It will be a collaborative effort among students, teachers, parent and administration to provide intense preparation in a college level course. In following this rigorous curriculum it is hoped that some or all will be able to take the AP exam in May and earn college credit or placement. The workload will be very challenging and the reward will be worth the effort. Calculus is not the end of a sequence of math courses studied during the high school years. Rather, it is a beginning of a new way of thinking and looking at the world of mathematics in our daily lives. It can be a joyous and enlightening experience.

Should you or your child feel that AP calculus is right for you, please know that it will be a commitment on all our parts. There will be extra help available in the mornings at 7:45-8:10 AM upon prior request. Added sessions may be necessary. I can be reached at (706)553-5218 or (706)553-0825 to discuss the course.

Student Evaluation

Class participation	10%
Homework & daily quizzes	25%
Tests	65%

Course Textbooks and Resources:

Larson/Hostetler. *Calculus*: D.C. Heath and Co.
The Princeton Review. *S.P. Calculus AB and BC Exams*
Best and Lux. *Preparing for the Calculus (AB) Exam*.
Gough, Gore, Crawford and Gough. *Work Smarter, Not Harder*
Foerster. *Calculus – Concepts and Applications*: Key Curriculum Press

Supplies Required:

Graphing Calculator (TI-83, TI-84, TI 86, or TI-89)
Notebook
Students will be requested to buy their own copy of the Best and Lux consumable listed above at approximately $17.00. We will order these in the fall.

Prerequisites:

Each student will have completed four years of secondary math designed for the college bound student. These include Algebra I, Algebra II, Geometry and Pre-calculus. They should have a comfortable working knowledge of functions, including linear, quadratic, trigonometric, logarithmic, and inverse. They should be adept at using the calculator to graph and also be able to visualize families of graphs without using the calculator. They should know all of the trig functions as well as most of the trig identities.

Course Outline:

This outline is intended to indicate the scope of the course, but it is not necessarily the order in which the topics will be covered. Exploration Masters will be used for individual and group work. These exploratory sheets allow students to discover various aspects of calculus on their own. They are asked to makes conjuture and then verify through different techniques. These will also help provide the cooperative learning phase of the course. Throughout the course students will be required to show work in a variety of ways: graphical, numerical, written sentences and orally. By using a variety of techniques to explain solutions students will more easily understand the mathematical connections. The use of calculators is an integral part of calculus in addition to the basic pencil and paper technique. Programs on the calculator such as finite integral and NDer are excellence in providing students with confidence in their work following the paper-pencil technique. Students will also be made aware that there are limitations in graphing technology. For example, using the trace feature will not produce the required accuracy. Throughout the course the students will utilize calculators to experiment, interpret results and be able to support conclusions. Classes vary and time designated for a particular topic may vary as well. Small projects and presentations may be added along the way.

Functions:

Students will complete a review of pre-calculus materials over the summer. Worksheets and solutions will be given for this review. One week reviewing and addressing questions will insure that all the material was understood and worked correctly.

Limits:

An intuitive understanding of limits
Calculating limits with algebra
Estimating limits with graphs or tables of data
The delta-epsilon definition of a limit
Describing asymptotes in terms of graphical behavior

Continuity:

Continuity at a point
Continuity on a closed interval
Continuity on an open interval
Intermediate Value Theorem

Derivatives:

The Tangent line problem
Basic rules for product, sum, quotient, and power functions
Mean Value Theorem
Chain Rule
Implicit Differentation
Trig Functions

Inverse Trig functions
Logarithmic Differentation
Exponential Functions
Second Derivatives

Application of Derivatives:
Curve Sketching – increasing and decreasing slope, points of inflection, concavity
Optimization – absolute and relative extrema
Related rates
Velocity, speed and acceleration
Rolle's Theorem

Antiderivatives:
Rules of integration
Trigonometric substitution
Integration by parts
Integration by partial fractions

Applications of Integrals:
Area under a curve
Area between curves
Calculating area by hand and with finite integral on calculator
Volumes of Revolution – shell and disc methods
Arc length
Surface of Revolution
Trapezoidal sums

Differential Equations:
Slope fields
Euler's Method
Exponential growth and decay

Review
The last 3-5 weeks will be used to review and practice old exams preparing for the test in May. We will use part released AP exams, exams from the Princeton Review and from our own works. A simulated test will be administered prior to the actual exam. Time after the test will be used to study advanced integration techniques. We will discuss the course and get ideas where improvement can be made.