Advanced Placement Calculus (Mathematics)

Honors Elective – Year – 12
Prerequisites: Pre-Calculus

Course Description

The philosophy of AP Calculus revolves around the ability of math to describe quantitatively the wonders of God's creation. The course is designed to prepare the students for the AP Exam in the spring by developing the student's understanding of the concepts of calculus and providing experience with its methods and applications. The course emphasizes a multirepresentational approach to calculus, with concepts, results, and problems being expressed geometrically, numerically, analytically, and verbally. The connections among these representations also are important.

Course Goal

The Christian teacher will:

1. continue to foster the Christian work ethic.
2. develop the concept of the derivative and the integral.
3. explore the uses of these mathematical concepts and apply them to practical situations.

Course Objectives

The student should be able to:

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

Course Outline

Semester 1

1. Prerequisites for Calculus (11 days)
2. Limits and Continuity (10 days)
3. Derivatives (30 days)
4. Applications of Derivatives (25 days)

Semester 2

5. The Definite Integral (26 days)
6. Differential Equations and Mathematical Modeling (22 days)
7. Applications of Definite Integrals (21 days)
8. Review for AP Exam (2 or 3 weeks)

Instructional Strategies

Teaching strategies include lecture, demonstration, group activities, and daily practice.

Grading Methods

The semester grade is broken into the following percentages:

Chapter Tests (60%)
Class work (15%)
Quizzes (10%)
Semester Exam (15%)

Grading Scale (By percent)

A (100-97)	B+(92-90)	C+(83-81)	D+(74-72)
A- (96-93)	B (89-87)	C (80-78)	D (71-68)
	B- (86-84)	C- (77-75)	D- (67-65)

Student Materials

Prentice Hall – Calculus, Graphical, Numerical, Algebraic, 2003; AP approved graphing calculator; notebook.

Classroom Procedures

Typically three or four days are spent on each lesson. Students are expected to work through assigned problems before class. A majority of class time is spent addressing problems on the homework assignment and working through problems. One or two quizzes will be given each chapter and chapter tests will be given over two days.