AP CALCULUS AB

C3- The course provides students with the opportunity to work with functions represented in a variety of ways-graphically, numerically, analytically, and verbally-and the connections among these representations.

Course Design and Methodology

The material for the course is presented in an intuitive fashion in the beginning. They are to think about the "why" and work on grasping the reasons for the major ideas and theorems. This is followed by a more rigorous approach. Throughout the course, students are expected to give justifications for their answers. Almost all proofs of theorems are presented and discussed. The graphing calculator is used to enhance the mathematical concepts. Several calculator labs are given to help students develop an intuitive feel for concepts. Our goal is to investigate ideas analytically, graphically, and numerically. Class participation is expected and there is a major emphasis on communicating with the correct use of language and mathematical notation. **[C3] [C4] [C5]**

C4- The course teaches students how to communicate mathematics and explain solutions to problems both verbally and in written sentences.

C5- The course teaches students how to use graphing calculators to help solve problems, experiment, interpret results, and support conclusions.

Calculator and Calculator Ideas

Almost all students use the TI-83, TI-84 or TI-89 graphing calculators. The calculator is used as a tool to find the following:

1. roots
2. points of intersection
3. the derivative at point
4. the value of a definite integral
5. sketching a function in a specified window

The calculator labs explore limits, derivatives, rates of change, curve sketching, Mean Value Theorem, rectangular approximation for area under a curve, definite integral, and 3-D visualization for finding volumes of solids of revolution. **[C5]**

Student Evaluation

Quarter grades are computed using homework, quizzes, tests, and take home tests. Multiple choice, essay, and calculator questions are given and students are encouraged to form study groups. Questions from previous AP exams are used for assessment throughout the year and for review. [C3] [C4]

Teacher Resources

Primary Textbook: Anton, Howard. *Calculus, Early Transcendentals-Single variable*, Brief Edition. 9th ed. New York: Wiley, 2009.

Supporting Materials

Best,George W. and Lux, Richard. *Preparing for the (AB) AP Calculus Examination.* Andover, MA.: Venture, 2006.

Crawford, Debra and Gore, Mary Ann. *Work Smarter Not Harder*, Calculus Activities for the Graphing Calculator

Schwartz, Stu. *Demystifing the AB Calculus Exam and Power Points for Calculus AB(Master Math Mentor)*

AP Central website

AP CALCULUS AB SYLLABUS

Chapter 0 Before Calculus [6 days] [C2]

0.1 Functions
0.2 New Functions From Old
0.3 Families of Functions
0.4 Inverse Functions; Inverse Trigonometric Functions
0.5 Exponential & Logarithmic Functions

C2-The course teaches all topics associated with Functions, Graphs, and Limits; Derivatives; and Integrals as delineated in the Calculus AB Topic Outline in the AP *Calculus Course Description*.

Chapter 1: Limits and Continuity [10 days] [C2]

1.1 Limits(An Intuitive Introduction)
1.2 Limits(Computational Techniques)
1.3 Limits at Infinity; End Behavior of a Function
1.5 Continuity
1.6 Continuity of Trigonometric, Exponential, & Inverse Functions

C2-The course teaches all topics associated with Functions, Graphs, and Limits; Derivatives; and Integrals as delineated in the Calculus AB Topic Outline in the AP *Calculus Course Description*.

Chapter 2: The Derivative [16 days] [C2]

2.1 Tangent Lines and Rates of Change
2.2 The Derivative (Definition)
2.3 Techniques of Differentiation
2.4 The Product & Quotient Rules
2.5 Derivative of Trigonometric Functions
2.6 The Chain Rule

Chapter 3: Topics in Differentiation [14 days] [C2]

3.1 Implicit Differentiation
3.2 Derivatives of Logarithmic Functions
3.3 Derivatives of Exponential & Inverse Trigonometric Functions
3.4 Related Rates
3.5 Local Linear Approximation; Differentials
3.6 L'Hopital's Rule; Indeterminate Forms

Chapter 4: The Derivative in Graphing & Applications [23 days] [C2]

4.1 Analysis of Functions I: Increase, Decrease, and Concavity
4.2 Analysis of Functions II: Relative Extrema; Graphing Polynomial
4.3 Analysis of Function III: Rational Functions, Cusps, & Vertical Tangents
4.4 Absolute Maximum & Minimum
4.5 Applied Maximum & Minimum Problems
4.6 Rectilinear Motion
4.7 Newton's Method
4.8 Rolle's Theorem; Mean Value Theorem

Chapter 5: Integration [21days] [C2]

5.1 An Overview of the Area Problem
5.2 The Indefinite Integral; Integral Curves and Direction Fields
5.3 Integration by Substitution
5.4 The Definition of Area as a limit; Sigma Notation
5.5 The Definite Integral
5.6 The Fundamental Theorem of Calculus
5.7 Rectilinear Motion Revisited Using Integration
5.8 Average Value of a Function & Its Applications
5.9 Evaluating Definite Integral by Substitution
5.10 Logarithmic & Other Functions Defined by Integrals

C2-The course teaches all topics associated with Functions, Graphs, and Limits; Derivatives; and Integrals as delineated in the Calculus AB Topic Outline in the AP *Calculus Course Description.*

Chapter 6: Applications of The Definite Integral In Geometry, Science, & Engineering [7days] [C2]

6.1 Area Between Two Curves
6.2 Volumes by Slicing; Disks and Washers
6.3 Volumes by Cylindrical Shells

Chapter 7: Principals of Integral Evaluation [3 days] [C2]

7.1 An Overview of Integration Methods
7.2 Integration by Parts
7.7 Trapezoidal Rule

Chapter 8: Mathematical Modeling With Differential Equations [7 days] [C2]

8.1 Modeling with Differential Equations
8.2 Separations of Variables
8.3 Slope Fields