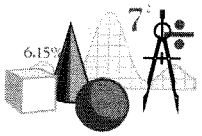

Course Description

The aim of AP Math is to focus attention on mathematical ideas, which are appropriate for study by college capable students, especially those interested in the field of science. The concepts and content for AP Calculus course incorporate the syllabus of the College Board. Graphing calculators are needed for this course as mandated by the College Board. An intense study of functions—algebraic, trigonometric, logarithmic, and exponential—occurs in this course. The derivative (Rate of Change) and applications of integration (Area, Volume) are incorporated into the study of each function. The course emphasizes a multi-representational approach to calculus and concepts, results, and problems being expressed geometrically, numerically, analytically, and verbally. Students are engaged in authentic applications involving limits and continuity, derivatives, integrals, transcendental functions, and infinite series. The course emphasizes a multi-representational approach to calculus, with concepts, results, and problems being expressed geometrically, numerically, analytically, and verbally.
Students enrolled in the class will be required to take the AP exam in May to receive course credit and extra weighting on their GPA. A majority of colleges in the United States will grant both placement and credit to students who test results demonstrate competency in this area. (Compiled from *DoDEA Curriculum Standards 2009 - Calculus* and *NCTM Standards / Grades 9-12)*

Goals

Students should be able to:

1. Understand the major topics of functions, limits, derivatives, and integrals.
2. Incorporate multiple representations of functions using graphic, numeric, analytic, algebraic, and verbal and written responses, and understand the connections among these representations.
3. Construct an understanding of derivatives as an instantaneous rate of change, applications of derivatives as functions, and use various techniques to solve problems including local linear approximations.
4. Understand definite integrals as a limit of Riemann sums, and as the net accumulation of sums, and use them to solve a variety of problems.
5. Develop an understanding of the Fundamental Theorem of Calculus as a relationship between derivatives and definite integrals.
6. Use graphing calculators to problem solve, experiment with 'what if' hypotheses, display and interpret results, and justify conclusions.
7. Make sense of and determine the reasonableness of solutions including units of measurement.
8. Develop an appreciation for an historical perspective of calculus.

Conceptual Organization

The content and level of depth of the material for this course is equivalent to a college-level course. The course content is organized to emphasize major topics in the course to include the following: (1) functions, graphs, and limits; (2) derivatives, and (3) integrals. Building on most students' prior knowledge, the course begins with a review of a variety of functions using multiple representations: graphic, numeric, algebraic, analytic, and verbal and written responses. Technology enhances students' constructing an understanding of mathematical relationships among the different representations used in solving problems. Then, this supports and leads to students' development and visualization of properties of limits and continuity, and rates of change of functions.

Course Format and Policies:

The classroom has desks arranged in rows although the students will be encouraged to work together. When students are working on a problem, they will often work alone initially but then turn to their partners for collaboration. Students are encouraged to form study groups to meet outside of classroom time. Additional time with the instructor will be available during seminars, after school and lunch (upon request).

When introducing new concepts, the class is expected to read the relevant section in advance and to have prepared notes. Class time is used for instruction and exploration into the new topics. . Lunch, after school and seminar are to be used for questions on homework or further understanding of topics.

Technology is utilized to enhance and deepen their understanding. Students have available TI-84 plus calculators, 4 computers, SmartBoard, WinPlot, internet and a document camera. Microsoft PowerPoint and the internet are utilized in the presentation of the topics so they are represented using the "rule of four": graphically, numerically, algebraically, and verbally.

Letter grades will be assigned for the numerical, weighted average of points earned on the following variety of assessment methods:

- Chapter tests (60%)
- Homework quizzes/Free Responses (40%)

Quarter grades are computed using the above individual categories. Each quarter grade represents 40 percent of the semester grade. The semester exam represents the remaining 20 percent of the grade.

Weighted grades are calculated for students completing and taking the requisite exam of an AP course.

Unweighted Scale A=4	Weighted Scale A=5
Unweighted Scale B=3	Weighted Scale B=4
Unweighted Scale C=2	Weighted Scale C=3
Unweighted Scale D=1	Weighted Scale D=2
Unweighted Scale F=0	Weighted Scale F=0

Textbook, Materials and Other Resources:

Required Textbook

- Finney, R. L., Demana, F.D., Waits, B.K., and Kennedy, D. (2010). *Calculus: Graphical, numerical, algebraic.* Upper Saddle River, NJ: Pearson Education-Prentice Hall.

Supplemental Textbooks and Readings

- Finney, R. L., Demana, F.D., Waits, B.K., and Kennedy, D. (2012). *Calculus: Graphical, numerical, algebraic.* Upper Saddle River, NJ: Pearson Education-Prentice Hall.
- Larson, R. E, Hostetler, R. P., Edwards, B. H. (1998). *Calculus with Analytic Geometry* Boston, MA: Houghton Mifflin Company.
- David Lederman (1998). *Multiple –Choice and Free-Response Questions In Preparation for the AP Calculus Examination – 7th Ed.* Brooklyn, NY: D & S Marketing Systems.
- David Lederman (2004). *Multiple –Choice and Free-Response Questions In Preparation for the AP Calculus Examination – 8th Ed.* Brooklyn, NY: D & S Marketing Systems.
- Sharon Cade, Rhea Caldwell, Jeff Lucia(2010). *Fast Track to a 5* Boston, MA: Brooks/Cole

Other Resources

- 4 Computers.
- MS PowerPoint, Prentice Hall Test Generating Program,
- Graphing calculators. TI-84 Plus
- Internet access and online resources.
    - Math Archives: Calculus Resources On-Line
      Web Site: http://archives.math.utk.edu/calculus/crol
    - Kelly, Greg. PowerPoint lectures for AB and BC Calculus
      University of Houston. Web Site: http://online.math.uh.edu/HoustonACT/

Course Outline

(Topics and presentation order may vary)

SEMESTER 1

Chapter 1Prerequisites for Calculus

- Lines
- Functions and Graphs
- Exponetial Functions
- Parametric Equations
- Functions and Logarithms
- Trigonometric Functions

Chapter 2 Limits and Continuity

- Rates of Change and Limits
- Limits Involving Infinity
- Continuity
- Rates of Change and Tangent Lines

Chapter 3 Derivatives

- Derivative of a Function
- Differentiability
- Rules for Differentiation
- Velocity and Other Rates of Change
- Derivatives of Trigonometric Functions
- Chain Rule
- Implicit Differentiation
- Derivatives of Inverse Trigonometric Functions
- Derivatives of Exponential and Logarithmic Functions

Chapter 4 Applications of Derivities

- Extreme Values of Functions
- Mean Value Theorem
- Connecting f ' and f " with the Graph of f
- Modeling and Optimization
- Linearization and Newton's Method
- Related Rates

SEMESTER 2

Chapter 5 The Definite Integral

- Estimating with Finite Sums
- Definite Integrals
- Definite Integrals and Antiderivatives Fundamental Theorem of Calculus
- Trapezoidal Rule

Chapter 6 Differential Equations and Mathematical Modeling

- Antiderivatives and Slope Fields
- Integration by Substitution
- Integration by Parts
- Exponential Growth and Decay
- Population Growth
- Numerical Methods

Chapter 7 Applications of Definite Integrals

- Integral as Net Change
- Areas in the Plane
- Volumes
- Lengths of Curves
- Applications from Science and Statistics

AP Exam Review

SYLLABUS

Unit	Week	Topics
1 Prerequisites for Calculus	1-2	Lines, Functions and Graphs, Exponential Functions, Parametric Equations, Functions and Logarithms, and Trigonometric Functions
2 Limits and Continuity	2-3	Rates of Change and Limits, Limits Involving Infinity, Continuit, Rates of Change and Tangent Lines
3 Derivatives	4-8	Derivative of a Function, Differentiability, Rules for Differentiation, Velocity and Other Rates of Change, Derivatives of Trigonometric Functions, Chain Rule
Derivatives	8-11	Implicit Differentiation, Derivatives of Inverse Trigonometric Functions, Derivatives of Exponential and Logarithmic Functions
4 Applications of Derivatives	11-14	Extreme Values of Functions, Mean Value Theorem, Connecting f ' and f " with the Graph of f, Modeling and Optimization, Linearization,

		Related Rates
5 The Definite Integral	14-20	Estimating with Finite Sums, Definite Integrals, Definite Integrals and Antiderivatives, Fundamental Theorem of Calculus, Trapezoidal Rule
6 Differential Equations and Mathematical Modeling	20-25	Slope fields and Euler's Method, Antidifferentiation of Substitution, Exponential Growth and Decay, Logistic Growth
7 Applications of Definite Integrals	25-29	Integral as Net Change, Area in the Plane, Volumes, Applications from Science and Statistics
AP Test Review	29 - 32	AP Test Review