AP Calculus AB
Syllabus

Course Overview

We will cover calculus topics as outlined in the *AP Calculus AB Course Description* through visual, graphical, numerical, and analytical methods in order to prepare each student for the AP Exam and success in future college courses.

The *AP Calculus AB Course Description* is available as a free download at http://media.collegeboard.com/digitalServices/pdf/ap/ap-calculus-course-description.pdf

Required Technology:

All students are required to use a TI-84 series graphing calculator. The graphing calculator is used to explore many topics throughout the course, but the four functionalities of graphing technology (finding a root, sketching a function in a specified window, approximating the derivative at a point using numerical methods, and approximating the value of a definite integral using numerical methods) that are required on the AP Exam are stressed.

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

Text Used:

Larson, Ron, Bruce H. Edwards, and Robert P. Hostetler. *Calculus of a Single Variable.* 7th ed. Boston: Houghton Mifflin, 2002.

Communicating Calculus:

Students must be able to communicate mathematics. Thus, each student will be presenting selected homework problems to his/her classmates. Names will be drawn randomly each day; the students whose names are selected will use the document camera to present the solutions to the assigned questions. The student presenter will be completely in charge of presenting the solutions to his/her assigned questions, answering the questions the class asks, along with ensuring that every student understands how to complete each problem correctly. The student presenter, who had the opportunity to come prepared to present the solutions, will be graded on his/her presentation. Each student in the class will be expected to submit his/her assigned homework within three school days of the solutions from that particular assignment being presented.

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

Each student will be required to produce three note cards each week. An actual calculus problem with formal directions must be written on one side of each note card with the solution on the other side. The solution side must include all steps necessary in solving the problem plus a concise verbal explanation.

Advanced Placement Calculus AB Course Outline

Section Numbers	Topics	Timeline
Handouts, P1, P2	Trigonometry, Parent Functions, Symmetry, Transformations	3 days
G.Sk, 1.1, handouts	Introduction to Slopes of Tangent Lines to Curves and all of the Rules for Derivatives	4 days
2.2	Basic Differentiation Rules and Finding the Eq. of a Line Tangent to a Curve	5 days
2.3	The Product and Quotient Rules (only)	2 days
2.4	The Chain Rule	2 days
2.5	Implicit Differentiation	2 days
Handouts	Review of Exponential and Logarithmic Functions	1 day
5.1	The Natural Logarithmic Function: Differentiation	2 days
5.4	Exponential Functions: Differentiation (only)	1 day
5.5	Bases Other than e and Applications	1 day
5.8	Inverse Trig Functions: Differentiation	1 day
Handout	Review of Factoring and Review of Rationalizing the Denominator	1 day
1.2	Finding Limits Graphically and Numerically	1 day
1.3	Evaluating Limits Analytically	4 days
Handout	Greatest Integer Functions and Evaluating Limits Graphically	1 day
1.4	Continuity and One-Sided Limits	2 days
1.4	The Intermediate Value Theorem	3 days
1.5	Infinite Limits	4 days
2.1	The Formal Def. of a Derivative and The Alternative Def. of a Derivative	4 days
CBR and Handout	CBR Experiment Exploring Position Function, Average Velocity, Instantaneous Velocity, and Acceleration	1 day
2.2, 2.3, 2.4	Rates of Change	2 days
2.5	Finding the Second Derivative Implicitly	1 day
2.6	Related Rates	4 days
3.1	Finding Extrema on an Interval (includes Extreme Value Theorem and Definition of Critical Numbers)	2 days
3.2	Rolle's Theorem and The Mean Value Theorem	3 days
3.3	Increasing and Decreasing Functions and The First Derivative Test	4 days
3.4	Concavity and The Second Derivative Test, and Points of Inflection	4 days
3.5	Limits at Infinity (Horizontal Asymptotes)	3 days

3.6	A Summary of Curve Sketching	4 days
3.7	Optimization Problems	4 days
3.9	Differentials	2 days
4.1	Antiderivatives and Indefinite Integration (Includes Introduction to Parametric Mode on Graphing Calculator when discussing Rectilinear Motion)	3 days
4.2	Introduction to Sigma Notation and Summation Formulas, culminating in Finding the Area of a Plane Region	3 days
4.3	Riemann Sums and Definite Integrals	3 days
4.4	The Fundamental Theorem of Calculus (Also included: The Mean Value Theorem for Integrals and Average Value)	4 days
4.5	Integration by Substitution	6 days
4.6	Numerical Integration	1 day
5.1	Definition of the Natural Logarithmic Function (and review of Chapter 5 material - differentiation - covered earlier in year)	3 days
5.2	The Natural Logarithmic Function: Integration	3 days
5.3	Inverse Functions	3 days
5.4	Exponential Functions: Differentiation (review) and Integration	3 days
5.5	More with Bases Other than e and Applications (Includes Pert)	3 days
5.6	Differential Equations: Growth and Decay	3 days
5.7	Differential Equations: Separation of Variables	4 days
5.8	Inverse Trig Functions: Differentiation (review)	1 day
6.1	Area of a Region Between Two Curves	3 days
6.2	Volume	3 days
7.7	L'Hôpital's Rule	1 day
Handout	Slope Fields	1 day
Handouts	Review of all material in preparation for AP Exam	10-15 days
	Testing and Interruptions due to Snow Days, Field Trips, etc.	Remaining Days

AP Grading Scale:

Due to the difficulty level of AP courses, all AP courses are on a different grading scale than the rest of the courses at FRHS. The AP Grading Scale, in brief, is shown at right.

Please refer to Student Handbook for full AP grading scale.

Percent	Letter
90%	A-
80%	B-
70%	C-
60%	D-
Below 60%	F

AP Calculus Note Cards

You will be expected to submit three note cards each week. To earn the maximum number of points per card, follow these directions:

- Use 4"x 6" index cards or larger as note cards. Written in marker, the "Title Card" will include the student's full name, school year: "2014-15", and name of class: "AP Calculus".

- The note cards must be written in your own handwriting. Colored pencils, pens, markers, highlighters should be used to emphasize important details. Any mistakes must be erased or whited out – not scribbled out.

- Each card will contain a specific problem presented on one side – complete with DIRECTIONS written out verbally… directions that include NO HINTS as to how the problem should be solved. The other side will contain the solution to that problem showing BOTH the mathematical steps to solve the problem and the verbal explanation of the steps – including any details (or hints) that were important in solving the problem.

- You are expected to include concepts (such as vocabulary definitions, memorized facts, explanation of theorems, etc.) as part of the verbal explanations on appropriate note cards that contain specific calculus problems that apply those concepts. (Note cards that only contain "notes" and no specific mathematical problem will NOT be accepted.)

- The chosen problems for the note cards will show a nice variety of the problems studied throughout the year. (In other words, no repeating content covered on previous note cards.)

- The chosen problem will reflect the expected difficulty level of the material being studied. If "too easy" of a card is submitted, the card will earn NO points.

- The cards will be numbered, from 1 to ???. ALL cards will be submitted each week. The notecards will be submitted in the following order with the specific problem (not the solution) visible on the top of the stack:

  Week One: 1, 2, 3, T T = Title
  Week Two: 4, 5, 6, T, 1, 2, 3
  Week Three: 7, 8, 9, T, 1, 2, 3, 4, 5, 6
  Week…

  This ordering will allow Mrs. Osterloh to move the new notecards from the top to the bottom of the stack as she grades the notecards.

- Each note card (besides the Title Card) must bear the creator's initials.

- Write on the note cards in such a way that questions and solutions can be presented via the document camera. (In other words, write in columns approximately 3" to 4" wide.)

- Optional: You may choose to record the book's page number, date notes were taken on the chosen problem, or etc. referencing you back to material to review.
  (This becomes helpful later in the year!)

Note Card Rubrics:

Basic Requirements:

- The Title Card was included.
- This note card was submitted on or before the due date.
  (No points will be earned if late.)
- ALL previous note cards were submitted along with this new note card.
- This note card does not duplicate any previous note card (or any other student's note card).
- All note cards are numbered consecutively (#1-???), including this new note card.
- The note cards are in the correct order.
- This note card includes the student's initials.
- A 4"x 6" index card or larger was used to create this note card.
- This note card was written in the student's own handwriting.
- Color was used to emphasize any important details.

If Basic Requirements above are met, continue grading.

(If Basic Requirements are not met, then the student has earned a 0% on this note card.)

1. This note card contains a specific problem presented on the front side – complete with DIRECTIONS written out verbally… directions that include NO HINTS as to how the problem should be solved. The chosen problem meets expectations regarding level of difficulty.

2. On the back side, this note card contains the correct solution to this note card's particular problem, showing the correct mathematical steps to solve the problem.

3. Also on the back side, this note card contains a correct verbal explanation of the steps – including any vocabulary, definitions, theorems, facts, or other details (such as hints) that were important knowledge in solving the problem.

No = 0 1 2 3 4 5 = Yes