TITLE: AP CALCULUS AB
COURSE NUMBER:
GRADE LEVEL: 11 – 12
LENGTH OF COURSE: 36 Weeks

MAJOR CONCEPTS:

AP Calculus AB introduces calculus topics in these areas, including concepts and skills of limits, derivatives, definite integrals, and the Fundamental Theorem of Calculus. The course teaches students to approach calculus concepts and problems when they are represented graphically, numerically, analytically, and verbally, and to make connections amongst these representations. Students learn how to use technology to help solve problems, experiment, interpret results, and support conclusions. Students will solve problems such as; finding volumes of curves, optimization, finding velocity and acceleration, and growth and decay.

EVALUATION TECHNIQUES:

Assessments:

- *Tests* are given at the completion of each unit. *Quizzes* are assigned frequently.
- *Midterm* is given at the completion of the 2nd quarter. This is a mock AP ® exam and will be worth 15% of the overall quarter grade.
- *Final Project* – A final project will be assigned in the fourth quarter. It will be due after completion of the AP ® exam. This will be worth 15% of the quarter grade.
- *AP® Exam* will be taken Tuesday, May 14th at 8:00 am.

Participation: 5 points will be given weekly for participation.

Students lose these points if they:

- Speak out of turn or are disrupting the learning experience
- Are tardy or have an unexcused absence
- Sleep in class or are not actively learning
- Fail to show up to afterschool/before school/Saturday scheduled meetings.

Class Work: Class work is to be completed in class. This includes class notes, 'do now' and any activity or lab that is to be done in class. Class work is collected when appropriate and will count towards your grade.

Homework: Homework will be assigned every day. All assignments will be due at the beginning of the following class period**.** Doing homework will ensure that you will not fall behind in this course. Late work will be accepted **only** in the case of an excused absence. All homework assignments are posted in the classroom.

GRADE SCALE:

1st & 3rd Quarter:

Participation	10%
Test/Quiz/ Project	75 %
Homework/Class-work	15 %

2nd & 4th Quarter:

Participation	5%
Test/Quiz/ Project	65 %
Homework/Class-work	15 %
Midterm/Final Project *	15 %

*Students will have a summative final project that will be due after taking the AP® exam. This will count as their Final Exam.

OBJECTIVES:

- Students should be able to work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.
- Students should 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.
- Students should understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change and should be able to use integrals to solve a variety of problems.
- Students should understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
- Students should be able to communicate mathematics both orally and in well-written sentences and should be able to explain solutions to problems.
- Students should be able to model a written description of a physical situation with a function, a differential equation, or an integral.
- Students should be able to use technology to help solve problems, experiment, interpret results, and verify conclusions.
- Students should be able to determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
- Students should develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

MathematicalThinkingPracticesforAPCalculus(MPACs)

MPAC 1: Reasoning with definitions and theorems

Students can:

a. use definitions and theorems to build arguments, to justify conclusions or answers, and to prove results;
b. confirm that hypotheses have been satisfied in order to apply the conclusion of a theorem;
c. apply definitions and theorems in the process of solving a problem;
d. interpret quantifiers in definitions and theorems (e.g., "for all," "there exists");
e. develop conjectures based on exploration with technology; and
f. produce examples and counterexamples to clarify understanding of definitions, to investigate whether converses of theorems are true or false, or to test conjectures.

MPAC 2: Connecting concepts

Students can:

a. relate the concept of a limit to all aspects of calculus;
b. use the connection between concepts (e.g., rate of change and accumulation) or processes (e.g., differentiation and its inverse process, antidifferentiation) to solve problems;
c. connect concepts to their visual representations with and without technology; and
d. identify a common underlying structure in problems involving different contextual situations.

MPAC 3: Implementing algebraic/ computational processes

Students can:

a. select appropriate mathematical strategies;
b. sequence algebraic/computational procedures logically;
c. complete algebraic/computational processes correctly;
d. apply technology strategically to solve problems;
e. attend to precision graphically, numerically, analytically, and verbally and specify units of measure; and
f. connect the results of algebraic/computational processes to the question asked.

MPAC 4: Connecting multiple representations

Students can:

a. associate tables, graphs, and symbolic representations of functions;
b. develop concepts using graphical, symbolical, or numerical representations with and without technology;
c. identify how mathematical characteristics of functions are related in different representations;
d. extract and interpret mathematical content from any presentation of a function (e.g., utilize information from a table of values);
e. construct one representational form from another (e.g., a table from a graph or a graph from given information); and
f. consider multiple representations of a function to select or construct a useful representation for solving a problem.

MPAC 5: Building notational fluency

Students can:

a. know and use a variety of notations (e.g., $f'(x), y', \frac{dy}{dx}$);
b. connect notation to definitions (e.g., relating the notation for the definite integral to that of the limit of a Riemann sum);
c. connect notation to different representations (graphical, numerical, analytical, and verbal); and
d. assign meaning to notation, accurately interpreting the notation in a given problem and across different contexts.

MPAC 6: Communicating

Students can:

a. clearly present methods, reasoning, justifications, and conclusions;
b. use accurate and precise language and notation;
c. explain the meaning of expressions, notation, and results in terms of a context (including units);
d. explain the connections among concepts;
e. critically interpret and accurately report information provided by technology; and
f. analyze, evaluate, and compare the reasoning of others.