

Squalicum High School

AP Calculus AB 2017/2018

Mr. Ottum

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Syllabus

Welcome! I am looking forward to working with you this year. AP Calculus AB is a full year, college level course in the calculus of functions of one independent variable. Upon completion, the student will have been provided all material needed for the College Board AB Advance Placement Calculus Test. Students will be challenged in significant ways to explore and obtain true understanding in a real-world context.

The AP Exam: *Every student is required to take the AP Calculus exam in May.* Financial help is available for those who need it. The exam will require that you learn the coursework in depth, develop your analytical reasoning skills, and form disciplined study habits. Some of the rewards for putting forth your best efforts are:

- college credit for as much as one semester or two quarters depending on your score. Most colleges will grant college credit for students earning a 3, 4, or 5 on the AP calculus exam. Almost all colleges will waive the math placement exam for incoming students with a 2, 3, 4, or 5 score on the AP Calculus exam.
- a demonstration of college readiness that will prepare you for continued success at the college level
- a selection advantage for the student who wishes to attend a highly competitive college.

Students who take the AP Exam are among the most academically capable students of the college-bound group. The exam is challenging, but you will have the opportunity to be well prepared. Taking the Calculus AP exam is like running a marathon. You need to start preparing months in advance if you hope to do well and finish the race. What you do starting in September will determine how well you do on the AP exam in May.

Academic Expectations: This is a participatory class and subject – students will learn more by *doing* math. Therefore, students need to set aside time each day after school to complete work, read the text, and study. Students are encouraged to establish study groups and arrange times outside of class for supplemental help from the teacher. Following an excused absence, students will be responsible for obtaining and completing missed assignments. This includes school related absences for sports, music, leadership, etc.

Grading is distributed as follows:

Tests, 70%



Assignments and
Projects, 30%

Tests: Tests are scheduled for the end of each unit. Students will arrange a time outside of class to make up tests missed because of an absence. Up to half of missed points on an individual test can be regained through corrections.

Assignments and Projects: These include daily individual and teamwork, weekly problem sets, and class projects. It is essential to keep current with daily work, as this is the best way to build skills and understanding. Late work will receive partial credit.

GRADING SCALE FOR AP CALCULUS

A- 90-92%

A 93-100%

B- 80-82%

B 83-86%

B+ 87-89%

C- 70-72%

C 73-76%

C+ 77-79%

F Below 60%

D 60-69%

Course Outline: This course is organized in three main themes:

I. Functions, Graphs, and Limits

Preparation for Calculus

- Graphs and Models
- Linear Models and Rates of Change
- Functions and their Graphs
- Fitting Models to Data

Limits and Their Properties

- Finding Limits Graphically and Numerically
- Evaluating Limits Analytically
- Continuity and One-Sided Limits
- Infinite Limits

II. Derivatives

Differentiation

- Basic Differentiation Rules and Rates of Change
- The Product and Quotient Rules and Higher-Order Derivatives
- The Chain Rule
- Implicit Differentiation
- Related Rates

Applications of Differentiation

- Extrema on an Interval
- Rolles's Theorem and the Mean Value Theorem
- Increasing and Decreasing Functions and the First Derivative Test
- Concavity and the Second Derivative Test
- Limits at Infinity
- Curve Sketching
- Optimization Problems
- Differentials
- Slope Fields

III. Integrals

Integration

- Antiderivatives and Indefinite Integration
- Area
- Riemann Sums and Definite Integrals
- The Fundamental Theorem of Calculus
- Integration by Substitution
- Numerical Integration

Logarithmic, Exponential, and Other Transcendental Functions

- The Natural Logarithmic Function: Differentiation & Integration
- Inverse Functions
- Exponential Functions: Differentiation and Integration
- Differential Equations: Growth & Decay; Separation of Variables
- Inverse Trigonometric Functions: Differentiation & Integration

Applications of Integration

- Area of a Region between Two Curves
- Volume of Solids

Classroom Structure: While direct instruction is a key component of the class, students will be organized in teams which will explore concepts and problems collaboratively. This course offers the opportunity for students to work with the key concepts from the Course Outline in a variety of ways.

Interpreting Problems and Solution Paths: Students will be presented with problems represented multiple ways. They will need to interpret the meaning of these problems, categorize them with respect to the three main themes, develop effective solution paths, and present solutions appropriate to the context of the problem. Problems will be presented:

- Numerically, with tables, rates, etc.
- Graphically, with specific coordinates or general representations
- Algebraically, with expressions, functions, formulas, etc.
- Verbally, with problems described in words rather than expressions, as well as in the context of real-world situations

Direct instruction, note-taking, exploratory problem sets, and small-team assignments will require that students be able to interpret functions represented verbally, as well as critiquing verbal descriptions from others.

Communicating Mathematical Reasoning: Students will be expected to present solutions numerically, graphically, algebraically, and verbally as indicated. Attention must be paid to the best way to clearly present justifications for solutions. This class will offer multiple opportunities to demonstrate understanding by showing processes through:

- mathematical steps and diagrams
- written explanations including complete sentences and paragraphs.
- oral representations in the context of teamwork, whole class discussions, and presentations

Regular teamwork is designed to facilitate oral communication. Students will be justifying reasoning as well as testing the reasoning of peers as they collaborate around classroom tasks and build consensus around solutions.

Making Use of Technology: We will occasionally use computers, our smartboard, and online tools for exploring ideas or assessing understanding. Our primary technological tool will be the graphing calculator. Students will use graphing calculators to:

- interpret problems using tables and graphs (such as rates of change, continuity, and differentiability)
- experiment by changing parameters or investigating the behavior of a function (such as near a limit)
- interpret results numerically and visually
- justify solution paths

While graphing calculators are essential tools for Calculus, they do not replace the thinking behind their use. When calculators are used, students will be expected to communicate the process in steps, diagrams, sentences, and discussions.

Academic Honesty: Collaborate responsibly and submit your own work. I value collaboration and encourage you to form study groups because it can facilitate learning, but it is essential that everyone be responsible individually for understanding the content. It is better to make an honest attempt at every problem and then compare and discuss your results. Academic honesty should be maintained at all times. Academic dishonesty includes, but is not limited to:

- exchanging information during an assessment without permission
- using unauthorized materials during a test, quiz, or other assessment
- presenting another student's ideas or work as your own
- allowing another student to cheat from your work

Classroom Expectations: Our classroom will be a safe and positive place for learning. We are all expected to...

- begin class promptly and ready to participate in learning.
- dress appropriately and put away any unnecessary food or electronic devices.
- engage in the lesson throughout the period.

Everything we do will show respect for ourselves, each other, and the school.

Materials: Each student will need...

- a bound notebook for notes (spiral bound notebook, composition book, etc. – preferably graph paper)
- graph paper for assignments
- a graphing calculator (TI-83 or TI-84 preferred)

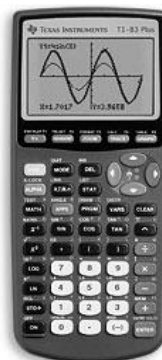
Examples:



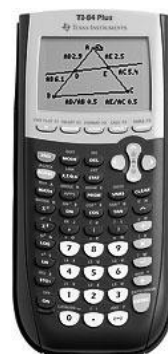
Spiral Notebook



Composition Book



TI-83



TI-84 Plus

Student Information

Please have a parent/guardian fill out and return this page. Only the top half is required (names and signature.) The other information is helpful, but not required. Thank You.

Student Name: _____ **Period:** _____

Parent/Guardian Name and Signature

I have received a copy of the AP Calculus AB syllabus.

Parent/Guardian Signature

Date

Parent/Guardian Printed Name

Relationship to Student

Contact Information

Primary Phone(s):	Second Phone(s):
Student E-mail:	Parent/Guardian E-mail:
Other Helpful Information: Is there something else I should know about your student? (strengths, concerns, etc.)	

**Please keep the first page of the syllabus and return only this page.*