

**MANATEE HIGH SCHOOL
MS. GRANSTAD
2016 - 2017**

AP CALCULUS AB SYLLABUS

Instructor: Ms. Amanda Granstad
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4th Period Planning

Textbook: Larson, Hostetler, Edwards. *Calculus of a Single Variable*.
8th ed. Boston: Houghton Mifflin, 2006

Course Description:

This is a comprehensive year-long course in the study of both differential and integral calculus and is intended to be the equivalent of a college level Calculus I course. Students will be studying the ideas of functions, graphs, limits, derivatives, integrals and the Fundamental Theorems of Calculus as outlined in the AP Calculus Course description (as it appears on the AP Central website). The intent is for students to master the fundamentals of calculus in order to succeed on the AP Calculus AB exam and be adequately prepared to be successful in higher mathematics courses.

Students should have mastery of material including the study of algebra, geometry, coordinate geometry, trigonometry, analytic geometry, pre-calculus, and elementary functions (linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise-defined functions). Students must also be familiar with the properties, algebra, graphs, and language of functions (domain and range, odd and even, periodic, symmetry, zeros, intercepts, and so on). Additionally, students should know the values of the trigonometric functions at the standard intervals (and their multiples).

Students should already have the ability to use a graphing utility to perform basic operations (graph a function in an appropriate viewing window, approximate zeroes, approximate extrema, find points of intersection, identify asymptotes, etc). Material will be presented using the TI-83 Edition calculator and students are encouraged to use this model, or another equivalent model approved for use on the AP exam. If a student cannot afford a graphing calculator, they will be able to check one out from the media center. Calculators must be brought to class every day as its use is an integral part of the course. By the end of the year, students should be able to use a calculator to graph a function in any window, determine the value of a derivative at a specified point, find the value of a definite integral, solve an equation, and intelligently analyze and interpret results. Calculators are NOT permitted on all assessments.

Materials:

A graphing calculator is required; a TI-83, TI-83 Plus or TI-84 Plus is strongly recommended.

Grade Percent Distribution

ACTIVITY	PERCENTAGE OF GRADE
Classwork	10 %
Homework	15 %
Quizzes	25 %
Tests	50 %

Homework & Classwork:

Homework is assigned daily. Solutions to homework problems are found graphically, numerically, analytically, and verbally in order to demonstrate knowledge of the calculus curriculum being studied. Proper symbolism and vocabulary is expected to be used in the classroom and on all assignments. On all work, solution alone will not be given credit. Answers must be accompanied by the appropriate work.

Quizzes & Tests:

Each assessment will contain a variety of question types: multiple choice, short answer, free response. Thus, you will have to express your answers in a number of different ways. Some responses may require a sketch along with a written explanation and others may require a verbal interpretation of the set-up of the problem. Tests will include any material that the instructor has taught from chapter 1 including any material from previous courses. They will also include Free-Response questions from previous AP Calculus Exams. Calculators are NOT permitted on all parts of assessments.

Make-up Work:

Students with excused absences will have an opportunity to make up missed work. They will be given as many days as they were absent to make it up. Long term assignments must be turned in, on or before required due dates. If the absence is unexcused the student will be unable to make up the work, and will be given a zero. **NO EXCEPTIONS!**

Disciplinary Policies:

Procedures in the student handbook will be followed for discipline consequences. In addition to this, students misbehaving may also be required to stay after school and do extra practice.

After School Tutoring: I will stay after school on Tuesdays and Thursdays for extra help. If you cannot make those times, please let me know and we can set up a different time before or after school.

Class Website: <http://granstad.weebly.com/>

Course Outline:

Functions, Limits, Continuity

(4 weeks, 1 test)

- Review of pre-calculus functions, their graphs, domain
- Graphical introduction to limits
- Limit theorem, one sided limits, limits at infinity
- Continuity of a function at a number, on an interval
- Continuity of a composite function
- Continuity of trigonometric functions
- Intermediate Value Theorem

The Derivative

(5 1/2 weeks, 2 tests)

- Slope of a tangent line
- Definition of the derivative
- Differentiation and continuity
- Numerical derivative
- Basic differentiation rules for polynomials
- Higher order derivatives
- The derivative as a rate of change
- Derivatives of trig functions, composite functions, chain rule derivatives of power functions
- Implicit differentiation

Applications of Differentiation

(5 weeks, 2 tests)

- Related rates
- Particle motion
- Maximum and Minimum function values
- Rolles' Theorem and Mean Value Theorem
- Increasing, Decreasing functions, First Derivative Test
- Concavity, Points of Inflection, Second Derivative Test
- Limits at infinity, describing asymptotic behavior using limits
- Summary of Curve Sketching, relating f , f' and f''
- Optimization Problems, both relative and absolute extrema
- Newton's method, Linear approximations,
- Differentials

The Definite Integral, Integration, & the Fundamental Theorems of Calculus

(5 1/2 weeks, 2 tests)

- Antidifferentiation
- Riemann sums and Definite Integrals
- First Fundamental Theorem of Calculus part 1
- Second Fundamental Theorem of Calculus part 2
- Area by rectangular approximations and trapezoidal approximations
- Average value of a function
- Numeric integration on the calculator

Logarithmic, Exponential & Other Transcendental Functions (5 weeks , 2 tests)

- Defining the Natural Logarithmic Function
- Logarithmic differentiation and integration
- Defining the Natural Exponential Function
- Derivatives and Antiderivatives of the Natural Exponential Functions
- Other Exponential and Logarithmic Functions, their derivatives and antiderivative
- Inverse Trig functions: differentiation and integration

Differential Equations and Applications of Integration (4 weeks, 1 test)

- Differential Equations - first and second order
- Slope fields, Euler's method
- Area using the definite integral
- Volume by disk, shell, slicing, and washer methods
- Growth and Decay applications
- More on limits and L'Hospital's Rule