

Course Syllabus

Course Title: MAT – 225 (Calculus I: Single Variable Calculus)

Location: Campbell High School

Year: 2016 - 2017

Instructor: Diane Angelini

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REQUIRED TEXTBOOK:

Calculus – Graphical, Numerical, Algebraic – 4th edition by Finney, Demana, Waits and Kennedy.

REQUIRED CALCULATOR:

Students must have a TI-83/84 graphing calculator. A different graphing calculator is acceptable as long as the student knows how to use and support it. Students may NOT use an electronic device that is connected to the internet (such as a phone, laptop, etc.) in place of a graphing calculator.

COURSE PREREQUISITES:

Students should have a background in pre-calculus. Please see the instructor with any questions.

COURSE DESCRIPTION AND GOAL:

Advanced Placement Calculus is a rigorous, fast-paced full year course and is the equivalent of a college-level calculus curriculum, covering introductory topics in differentiation and integration. Students will learn about the theory of limits, continuity, differentiation, derivatives and their applications, including curve sketching, maximum/minimum problems and related rates, anti-differentiation techniques, integrals and their applications and the Fundamental Theorems of Calculus as well as how to solve differential equations graphically and symbolically. The course focuses on giving the students the training and knowledge necessary to pass the AP Calculus exam. In addition, students will gain experience solving real-world problems involving calculus, including problems in business, economics, natural sciences and social sciences.

STUDENT LEARNING OUTCOMES:

Upon completion of AP Calculus, students will be able to:

- Find limits of functions
- Determine whether and where a polynomial, rational, logarithmic and exponential function is continuous (**Integration, Application and Reflection- Transfer**)
- Compute derivatives of polynomial, rational, logarithmic and exponential functions
- Compute integrals of polynomial, rational, logarithmic and exponential functions
- Recognize and solve problems requiring the Fundamental Theorem of Calculus (**Knowledge of Human Cultures and the Physical and Natural World**)
- Calculate and interpret a variety of applied calculus problems (**Communication**)

COURSE COMPETENCIES:

- Explain and justify reasoning when solving mathematical problems.
- Apply and extend properties of number systems.
- Create tables, graphs, and equations as ways for depicting and analyzing patterns, relations and functions.
- Design models that can be used to represent and understand quantitative relationships.

COURSE TOPICS:

- Chapter 2 - Limits and Continuity
- Chapter 3 - Definition of a Derivative, Graphical Derivatives, Differentiability, Velocity and Derivatives of Trigonometric Functions
- Chapter 4 - Additional Derivatives – Chain Rule, implicit Differentiation and Derivatives of Exponential and Logarithmic Functions
- Chapter 5 - Applications of Derivatives – Mean Value Theorem, Connecting 1st and 2nd Derivatives with their Graphs, Modeling and Optimization and Related Rates
- Chapter 6 – The Definite Integral – Riemann Sums, Anti-derivatives, Average Value Function and 1st Fundamental Theorem of Calculus
- Chapter 7 – Integration by Substitution , Differential Equations,
- Chapter 8 – Applications of Definite Integrals – Integral as Net Change, Area Between Two Curves, Volumes and Applications from Science and Statistics
- Chapter 9 – L’ Hopital’s Rule
- Chapter 10 – Taylor Series

COURSE FORMAT:

The format of the course will include lecture, large group problem solving and small group work sessions.

COURSE EVALUATION CRITERIA AND GRADING POLICY:

Grading will be based on a *total point* system. Summative assessments (i.e., homework and class work assignments, quizzes and unit tests and the final exam) will account for 100% of the final grade. Students will have multiple opportunities to demonstrate a competent performance level of core competencies. There will be at least four of these opportunities per competency/per semester. Specific summative assessments are eligible for a retake.

All students will be required to take a cumulative Final Exam and the Final Exam results will be used to assess student competency for the SNHU Gen Ed according to the following rubric:

Criteria	Not Evident	Limited	Developing	Competent	Accomplished
Students will demonstrate a command of mathematics in the area of: +	Attain less than 35% correct.	Attain between 35% and 49% correct.	Attain between 50% and 64% correct.	Attain between 65% and 84% correct.	Attain at least 85% correct.
Points	0	1	2	3	4

Numerical grades will be rounded and converted into letter grades in the following manner:

93 – 100	A
90 – 92	A-
87 – 89	B+
83 – 86	B
80 – 82	B-
77 – 79	C+
73 – 76	C

70 – 72	C-
65 - 69	D
Below 65	F

Notes concerning homework:

- Keeping up with homework assignments is vital to success in the class!
- Homework will be assigned at the end of each class and is due in the next class meeting.
- No late homework will be accepted.
- Answers only are not acceptable; all necessary steps must be shown.
- Students experiencing trouble completing homework assignments are encouraged to see me and make an appointment for extra help!
- Before submitting homework, students should check the answers to odd-numbered problems in the back of the text to make sure that their solutions are correct.

Classroom Expectations:

- Be prepared – you must bring pens or pencils and a 3 ring binder with notebook paper and folders to every class.
- Be polite and respectful.
- Be productive – you will be an active learner during every class and class participation and collaboration in pairs and groups is essential to learning.
- Be proactive – you must take the initiative to let me know you need extra help as soon as you begin experiencing difficulty learning the concepts introduced in class.

Notes to Students:

- Keep every piece of paper that you come across in this class! Try and stay organized!
- This class is going to be a bit different than earlier math classes. You will constantly see problems that “don’t look like” problems you had been working on. You will be pushed to apply what you know to different situations. Success here implies deep understanding.
- When you are stuck on problems away from class, don’t just give up on them! There are tons of websites with useful information and you can, upon request, get access to a second Calculus text to use as a reference. Put effort into getting past roadblocks along the way!
- History in Calculus has proven that working with others from the class on homework, take-home assessments, or just studying material is beneficial. I encourage as many of you as possible to work together outside of class as frequently as it is feasible.

ATTENDANCE POLICY:

- Students are expected to attend and be present for the entire class meeting.
- Students should come to class prepared, plan to ask questions and participate in the class discussion.

Campbell High School’s mission is to join together with parents, students, staff and community to become a collaboration of learners born of character, courage, respect and responsibility.

Students are expected to read and follow all rules and expectations as outlined in the student handbook.

Please sign to indicate that you have received, read and understand this document.

Student Name: _____ **Student Signature:** _____

Parent/Guardian’s Signature: _____ **Date:** _____

Assignment Schedule

Approximate Number of Classes (90 minute blocks)	Chapter	Topic
7	2	Review of Summer Work and Limits and Continuity – Rate of Change and Limits, Limits Involving Infinity, Rates of Change and Tangent Lines
10	3	Derivatives – Derivative of a Function, Differentiability, Rules for Differentiation, Velocity and Derivatives of Trigonometric Functions
7	4	More Derivatives – Chain Rule, Implicit Differentiation, Derivatives of Exponential and Logarithmic Functions
13	5	Applications of Derivatives – Mean Value Theorem, Connecting f' , f'' and the Graph of F , Curve Sketching – Max/Min, Concavity and Points of Inflection, Modeling and Optimization, Linear Approximation and Related Rates.
7	6	The Definite Integral – Estimating Area with Riemann Sums (Left, Right, Midpoint and Trapezoidal), Methods of determining Definite and Indefinite Integrals, Anti-derivatives,
Midterm Exam		
6	6	U-substitution and the First and Second Fundamental Theorems of Calculus
7	7	Differential Equations and Mathematical Modeling – Slope Fields and Solving Differential Equations, Applications of Exponential Growth and Decay and Logistic Growth.

11	8	Applications of Definite Integrals – Integrals as Net Change, Area Between Two Curves and Volume of Solids of Revolution, Cross-sectional Area and Applications from Science and Statistics.
2	9	L' Hopital's Rule
2	10	Taylor Series
13	AP Exam Review	Students are next presented with an intense collection of AP problems balancing between actual multiple-choice and free response questions as well as outside resources. Small groups of students take on these problems without significant guidance to begin. In addition, there will be daily assessments of random AP style questions.
After AP Exam	Various	Select BC topics will be introduced as time allows.