AP  Calculus AB – Syllabus

Instructor: Tim Pust

Golden Valley High School

Room 316

**Overview**:

The purpose of this AP Calculus course is to provide an opportunity for students to develop mastery in the concepts listed in the College Board’s *AP Calculus Course Outline*. The goal of this course is to prepare students to score a 3 or better on the AP Exam and learn calculus well enough to be successful in subsequent courses.

The underlying theme used throughout this course is to have students understand functions from the Rule of Four perspectives: graphic, numeric, algebraic and verbal. It is my belief that students develop maximum understanding when they are provided opportunities to explore, discover, investigate, and discuss challenging new concepts. Calculus is based on just a few fundamental concepts- limits, tangent lines, and approximations. But as the subject is explored, we will find a discipline that is capable of solving innumerable problems of great importance.

With that in mind, students completing this course should be able to:

1. understand the ***connections*** between four various mathematical representations: graphical, numerical, analytical, and verbal
2. ***communicate*** mathematics both orally and in well-written sentences, including being able to explain one’s solutions to problems
3. ***model*** a written description of a physical situation with a function, a differential equation, or an integral
4. use ***technology*** to help solve problems, experiment, interpret results, and verify conjectures
5. determine the ***reasonableness*** of solutions, including sign, size, relative accuracy, and units of measurement
6. develop an ***appreciation*** of calculus as a coherent body of knowledge and as a human accomplishment

**Teaching Strategy:**

I am a firm believer that students perform best when they understand why a concept is true. I will emphasize deep understanding and an appreciation for representing answers in a multitude of ways. My expectation of every student in this class is to understand calculus well enough to pass the AP exam in May, ideally with a score of 5. This will occur when you strive to understand how the concepts work, not just rote memorization. This takes practice and time. Calculus is learned best by doing. There is no other way. You cannot learn Calculus vicariously. Always remember the *Principle of the Harvest*. You cannot harvest meaningful crops by cramming a bunch of seeds into the ground and expect a bountiful return on the following day. You will reap what you sow. You will only reap a bountiful harvest in this course by thoughtfully, intentionally, reflectively, and in a disciplined manner working through the work of the course on a routine basis. Cramming will not generate success.

|  |  |
| --- | --- |
|  | Helping others has been proven by research to increase understanding and retention of concepts. Thus, a small-group structure will be used virtually every day in this class. Expectations for behavior in this type of setting will be shared and discussed. You will be expected to learn from the teacher, learn from your classmates, *and* help your classmates learn as well! |

**Student Evaluation:**

I have high expectations in my class and want all AP Calculus students to be successful. It is my experience that students who attend class regularly and participate in all assigned activities stand the best chance to master material and succeed. My grading policy reflects these beliefs.

|  |
| --- |
| Students are expected to complete assignments on time. Tests are given at the end of each unit. A final will be given at the end of each semester. Your grade will be determined by using the following scale:  |

**Homework : 20%**

|  |
| --- |
|  |
|  Homework will be assigned at the conclusion of each section of notes. Most assignments will be checked the following meeting at your desk for *attempt* & *completion.* Keeping up with daily homework is **essential** for mastery of material and success in the course. |
| **Quizzes: 20%** You can expect very frequent quizzes. Each quiz will be worth a small amount of points. Performance on a quiz- both good or bad- will not have an adverse effect on your grade. Taken as a whole, however, they will greatly affect your grade. The purpose is to develop a sense of speed and automaticity.  |

**Tests: 50%**

|  |
| --- |
|  There will be at least one major tests for each chapter of textbook material covered. All unit tests will be taken individually and will be cumulative in nature. Most tests will be given in two parts: a) calculator and b) non-calculator. Generally speaking, I will devote the day before a test strictly for review. ***If you are absent on a unit review day (without other absences immediately prior to this), you WILL take the unit test on the day it is scheduled***. This policy is non-negotiable!!! Expect tests to be cumulative in nature. There will be no study guides provided for exams.  |
|  |

**Semester final: 10%**

 A final exam will be given at the conclusion of the first semester and will be cumulative. At the conclusion of the second semester the students will complete a final project.

**Grading Scale:**

100 – 89.5%: A 89.49 – 79.5%: B 79.49 – 69.5%: C 69.49-59.5: D 59.49%-0: F

Grades are cumulative through the semester. First quarter and third quarter grades are the cumulative grade earned to the middle of each semester.

**Make up/Late Work Policy:**

|  |  |
| --- | --- |
|  | **You must show your work to receive full credit**. The grade for any late assignment will be significantly lowered. **Any assignment not made up will result in a zero-INCLUDING Quizzes and Tests!! You must show your work to receive full credit.** |

**Posting of Grades:**

|  |  |
| --- | --- |
|  | I will do my best to update the online Aeries grade book on a regular basis. With that said, it is the student’s responsibility to monitor their progress at all times and to seek intervention when necessary.  |

I will NOT round up final grade percentages! Consistently do the best work you can, and let the numbers fall where they may.

I will make myself available for tutoring at times to be announced once the school year begins. **Your success in my class is my biggest concern as a teacher. Please see me at any time to discuss the possibility of receiving extra help. I would be more than happy to schedule a meeting beyond school hours if necessary, and you can reach me by email.**

**Technology:**

Students are expected to become proficient in the use of their graphing calculators as they explore, investigate, analyze, discuss and solve problems using and expanding from the following fundamental procedures:

* Plotting the graph of a function within an arbitrary viewing window
* Finding the zeros of functions (either graphically or using the solve function)
* Numerically and analytically calculating the derivative of a function
* Numerically and analytically calculating the indefinite and definite integrals of functions

Every student in the class will be expected to use one or more of the following proficiently: a TI 83, 84, 89, or Nspire. Students usually purchase their own calculators. Calculators are provided for students for whom this is a financial burden. There are 16 calculators available to be checked out in the classroom. Students are encouraged to develop a clear sense of when it is appropriate to use a calculator and when a calculator is not appropriate. Tests are divided in to calculator and non-calculator sections.

I will also utilize interactive whiteboard technology, TI Presentation, Khan Academy, and more to enhance the curriculum.

**Discipline Policy:**

|  |  |
| --- | --- |
|  | The expectations for appropriate behavior come down to one concept: RESPECT. I expect you to treat the teacher and your classmates with respect, and I will do the same for you. However, should ***minor*** discipline problems occur, the following consequences will occur: |

**Academic Dishonesty:** It is expected and assumed that all materials you turn in will be your work alone. Academic dishonesty includes copying homework, giving or receiving help on a test, and plagiarizing. If you are caught doing any of these, you will fail that particular assignment or test. Cheating is not acceptable!!!

**Inappropriate Behavior:** The use of inappropriate words, gestures, or actions will NOT be tolerated. Under NO circumstance will I tolerate anyone putting down another classmate for ANY reason!

**Course Outline:**

A course calendar for AP Calculus is listed below and the calendar is used to direct the progression of the course. However, instruction is guided by student need as well. Lessons will be a mix of lecture, student investigation and discussion.

Chapter 2 : Limits and Continuity

            2.1 Rates and Change and Limits

            2.2 Limits Involving Infinity

            2.3 Continuity

            2.4 Rates of Change and Tangent Lines

Chapter 3: Derivatives

            3.1 Derivative of a Function

            3.2 Differentiability

            3.3 Rules for Differentiation

            3.4 Velocity and Other Rate Change

            3.5 Derivatives of Trigonometric Functions

            3.6 Chain Rule

            3.7 Implicit Differentiation

            3.8 Derivatives of Inverse Trigonometric Functions

            3.9 Derivatives of Exponential and Logarithmic Functions

Chapter 4: Applications of Derivatives

            4.1 Extreme Values of Functions

            4.2 Mean Value Theorem

            4.3 Connecting f’ and f” with the Graph of f

            4.4 Modeling and Optimization

            4.6 Related Rates

End of Semester 1

Chapter 5: The Definite Integral

            5.1 Estimating with Finite Sums

            5.2 Definite Integrals

            5.3 Definite Integrals and Antiderivatives

            5.4 Fundamental Theorem of Calculus

            5.5 Trapezoidal Rule

Chapter 6: Differential Equations and Mathematical Modeling

            6.1 Antiderivatives and Slope Fields

            6.2 Integration by Substitution

Chapter 7: Applications of Definite Integrals

            7.1 Integral as Net Change

            7.2 Areas in the Plane

            7.3 Volumes

Review and Preparation for the AP Exam

**After the AP Exam:**

The students will work on their Final Project: Volumes of known Cross section.

End of Semester 2