AP Calculus/AS Cambridge Mathematics

2018-19

Instructor: Mr. Meléndez

Contact Information

Classroom # 201;   602-496-3082 (M-F; 8:00 -8:25 AM or 4-5 PM)

email: javierm@asu.edu

website: jmelendezasuprep.weebly.com

Course Description
The study of calculus is the result of a great intellectual journey, one that took nearly two thousand years! In a nutshell, calculus is the mathematics of *change*, and it has two central ideas. The first central idea is that it allows us to determine the instantaneous rate of change of a function. The second, is that calculus allows us to determine the net effect or accumulation of a changing function. These two central ideas turned out to be inextricably connected with a wide range of applications.
There is an adage that says, "the only constant is change", in other words, change is always occurring. The ability to quantify and model *changes* therefore gives us the power to understand past and future phenomena. Calculus turns out to be the language of scientists, engineers, economists, and many other professionals where change must be quantified and understood.

Even if you have no interest in fields of study that require calculus, your study of calculus in high school can be a tremendous opportunity for you that will help you grow intellectually and expand your options in college and beyond.

Course Math Standards

You will be evaluated based on your mastery of the Cambridge AS Math Standards along with the standards of AP Calculus AB math standards.

- Number, Quantity, & Approximation
- Limits and Continuity
- Differentiation
- Integration
- Mathematical Modeling

Daily Required Materials

Please have the following materials with you <u>every day</u> in class:

- **Quadrille, bound math journal**
  Your journal should be used on a daily basis for the purpose of taking notes, writing reflections, or addressing any other classroom tasks. This journal should serve as a valuable resource for studying and reviewing concepts. Take great care and pride with your journal as this will serve as your most valuable resource.

- **pencils/pens** (mechanical pencils are recommended)
  All assignments, quizzes, and exams should be done in pencil unless told otherwise.

- **scientific calculator** (has *sin, cos, tan*, and l*og* buttons) or **graphing calculator** (recommended; not required)
  You are encouraged, but not required to purchase a graphing calculator so that you may become comfortable with it when its use becomes necessary. This will also be a good investment for future college level math and science courses. However, you will be provided with a graphing calculator if needed for use in the classroom. Please return these to their designated place at the end of each class. My apologies but these are not available for checking out and taking home. Please note that the use of a scientific or graphing calculator will be prohibited on some classroom assessments.   The use of a calculator app on your phone is never allowed during class time.

- <u>**2" -three ring binder:**</u> The three ring binder should be used to keep all class handouts as well as all of your assignments (graded or ungraded) neatly and chronologically (most recent on the bottom). Please place the date in the upper right hand corner of every assignment and handout. You may keep this in the classroom if you wish.

Classroom Behavioral Expectations

- Be on time, appropriately dressed, and have all of your required daily materials

- Every class is crucial! Make a great effort to attend <u>every</u> class; more than <u>two</u> absences (excused or not) per quarter is too many!

- Be respectful of <u>everyone</u> and treat them with dignity, respect, and kindness at all times; be willing to collaborate; help others and let them help you. We are a *community* with a common learning mission

- Follow the classroom and school rules and policies

- Take care of the classroom facilities and all the materials and equipment contained within it. Always follow the teachers' instructions with respect to proper use of materials and equipment. Please help clean up and return all items to their designated places.

- Be diligent, focused, and engaged at all times – give maximum effort

Classroom Policies

- No food, candy, snacks, or beverages (besides water) are allowed in the classroom. Gum is allowed provided it is not a distraction for you or others.
- Personal electronic devices (phones, tablets, etc.) should be "off" and out of sight unless permission is granted for their use in a classroom activity or for taking a picture of a whiteboard display or demonstration. You may not "take" any calls during class. You must leave your phone in the classroom whenever you leave for the bathroom.
- Wait for an appropriate time to ask permission to go to the restroom and please do so sparingly (1-2 times per week). Please be sure to sign yourself "out" only after permission has been given.
- Healthy snacks and beverages can be consumed in the classroom during designated tutoring/study sessions that take place before school, during lunch, or after school. Please clean up after yourselves.

Start of Class Procedures

At the official class start time please take a seat and attend to the "First Five" task that will be displayed on the board. You will have five (5) minutes to complete the task in your journal. During this time you should work quietly and independently. You should be prepared to defend, justify, or explain your response.

Assignments

The completion of assignments/homework is crucial to your success in this class. The intent of homework is not to serve as "busy" work, or just practice, but to help you develop conceptual understanding, discipline, and problem solving skills. Although most assignments will not be collected or graded, it is in your best interest to complete all of your assignments. We will whiteboard and discuss several of the assigned problems in class on a daily basis. If you have not completed the work, you will not be able to participate actively and learn as much as possible. Please note on the upper left hand corner the approximate amount of time that you were actively engaged on the assignment. Your success on the written exams will depend largely on how well you engage with the assignments *both* in and outside of class time. I will frequently do a quick inspection of your assignments to ensure that you are working diligently. Calculus is not a spectator sport!   You will occasionally have assignments/projects that will be collected, graded, and returned. These assignments will have firm deadlines with penalties for late submittals.

Evaluation and Assessment

You will be graded based on the level to which you master the standards and objectives by the end of the course. However, the following percentages will serve as guidelines for determining your current grade. You are also guaranteed a grade no lower than that which falls under this scale.

A[*]   ≥ 97%

A   90-96%

B   80-89%

C   70-79%

D   60-69%

Your grade will be weighted <u>approximately</u> in the following manner:

Formal Written Assessments (quizzes, exams)   50%

Assignments, Journal and Binder   10%

Participation; Informal Assessments & Activities   20%

Class Final Exams in Dec. and May (not AP or AS)   20% [*]

The final year end exam in May will be weighed more heavily in the case where it is beneficial to the student's overall grade. This exam will consist largely of problems from the most recent Cambridge and AP exams.

<u>AP and AS Scoring Rubric</u>

The AP and AS exams are graded using distinct scales. AP exam results become available in early July, while AS exam results will become available in early September. AP uses three levels of qualifying scores (3-5) while Cambridge uses five levels (a-e). The following scales are used for these exams.

<u>AP Grading Scale</u>

    5: extremely well qualified

    4: well qualified

    3: qualified

    2: possibly qualified

    1: no recommendation

AS Cambridge Grading Scale

        a: Cambridge standard met at the highest level

        b: Cambridge standard met at the 4th level (2nd highest) level

        c: Cambridge standard met at the 3rd level

        d: Cambridge standard met at the 2nd level

        e: Cambridge standard met at the lowest level

        U: Cambridge standard was not met

Strong performance on the AP and Cambridge exams can qualify you for an automatic grade change increase regardless of your final percentage score and grade earned at the end of the school year. You can also qualify for college credit and/or placement into higher level college math classes. In other words, there is considerable incentive for performing well on these exams. Your performance on these exams will not lower your end of the year grade. The grade changes below will take effect if they apply and if they result in a grade higher than what was achieved at the end of the school year. These changes will be implemented in September 2020.

Scores	Grade change
AP score of "5" plus AS score of "a"	A*
AP score of at least "4" plus AS score of at least "c"	A
AP score of at least "3" plus AS score of at least "c"	B
AP score of "3" or AS score of at least "d"	C

Please see me as soon as possible for any concerns or difficulties that you may have. I want this class to serve as a great learning experience for you and I sincerely want to help you achieve your academic goals.

Course Outline/Learning schedule

1) Vectors
   a) Notation and operations
   b) Scalar product
   c) Geometric interpretations and applications

2) Coordinate Geometry and Circular Measure
   a) Slopes (gradients);parallel and perpendicular line relationships
   b) Radian measure definition; radian and degree relationship
   c) Arclength and sector area relationships

3) Limits
   a) Functions and limit values
   b) Limit Rules
   c) Squeeze Theorem
   d) Continuity

4) Differentiation
   a) Average rates of change
   b) Definition of the Derivative
   c) Instantaneous rates of change
   d) Differentiation Rules
   e) Derivatives of trigonometric functions
   f) Derivatives of Inverse Functions
   g) Derivatives of exponential and logarithmic function
   h) Chain Rule
   i) Implicit Differentiation

5) Applications of Derivatives
   a) Related rates
   b) Linear approximations to functions
   c) Finding function extrema
   d) The Mean Value Theorem (MVT)
   e) Sketching functions using derivative tests
   f) Limits at infinity and asymptotic behavior
   g) L'Hopital's Rule
   h) Optimization
   i) Newton's Method

Second Semester (January 9th – April 5th)

6) Integration
    a) Anti-derivatives
    b) Approximating areas
    c) Riemann sums
    d) The Definite Integral
    e) Fundamental Theorem of Calculus
    f) Basic Antiderivatives and Integration formulas
    g) Geometric, algebraic, and trigonometric simplifications
    h) Rational functions
    i) Integrating functions by substitution and anti-chain rule
    j) Integrating exponential and logarithmic functions
    k) Integrating inverse trigonometric functions

7) Applications of Integration
    a) Areas between curves
    b) Volumes by slicing
    c) Volumes of revolution: disk and shell methods
    d) Trapezoidal Rule
    e) The Net Change Theorem – Accumulating Functions

8) Differential Equations
    a) Separable differential equations
    b) Exponential growth and decay
    c) Terminal speed
    d) Slope fields

9) Parametric Equations

10) Numerical solutions of equations

<u>Review</u> (April 8th-May 14th)

11) Review Topics and Exam Preparation
- a) Remainder Factor Theorem (polynomial division)
- b) Series and Sequences
- c) The Binomial Theorem
- d) Arithmetic and geometric sequences
- e) Absolute value equations
- f) Solving exponential and logarithmic equations
- g) Trigonometric identities and equations
- h) Simulated AP and AS exams
- i) Practice exam questions

AS Exam: Part 1- Wednesday, May 8th; Part 2-Wednesday, May 15th

AP Exam: Tuesday, May 14th

<u>Additional Topics </u>(time permitting)

12) Integration by parts, arclength, surface area

ASU Preparatory Academy
ARIZONA STATE UNIVERSITY

AS/AP Math– ASU Prep Student Contract

I, _____ (student printed name)

am committed to passing the AP Calculus Exam (May 14, 2019) and the AS Cambridge Mathematics Exam (May 8th and 15th, 2019. I understand that this will require a significant effort on my part. In order to achieve this goal I am committed to the following:

1) Spend at least 5 hours per week outside of class, working on problem sets, related readings and practice/extension problems. Please note the amount of uninterrupted time that you spend on each assignment.

2) Attend class consistently with no more than eight (8) absences (excused or unexcused) for the year.

3) Complete all assignments and attend after school tutoring/work sessions when struggling with the concepts and/or completing assignments.

4) Attend at least two hours of mandatory tutoring per week (room 201) if your yearly grade at any time drops below 70%. Tutoring will become mandatory until the grade is at least 70%. This will become effective beginning Tuesday, August 14th.

5) Complete three hours of additional class work on each of the following days: Wednesday, October 10th; Wednesday, January 9th and Tuesday, March 19th. The meeting times for these dates will tentatively be 9AM-12PM. Please note that these are on the second day of ILP conference dates.

6) Attend study and review sessions after school, each day from 4-5PM during the period of April 29th- May 14th, 2019. These hours may be partially substituted by attending on Saturday, May 4th and Saturday, May 11th from 9AM- 12PM.

Student Signature _____ Date_____

Parent Signature _____ Date_____

August 1, 2018

Dear Parents,

Your child is a student in my Calculus class at ASU Preparatory Academy. S/he is committed to passing both the Advanced Placement (AP) and Cambridge AS level examinations that will take place in May 2019. The rigor of this class will be at the level of a first year college level calculus class. If your child scores sufficiently high on either of these exams, they may earn college math credit. More importantly, the intent of the class is to prepare students for success in future college and university level courses in mathematics and the sciences. Even if your child has no interest in these areas, the benefits of learning calculus are tremendous and may open up a variety of other possibilities for future studies and career options.

Please support and encourage your child to work diligently, complete all assignments, attend all classes, and attend regular tutoring as needed for success. I really want your child to succeed and I am committed to helping them be successful in my class. I am generally available every school day, 4-5 PM to help, tutor, or provide a good place to study. I am confident that with perseverance, patience, and hard work, your child's effort will be rewarded. Please note the student expectations that are attached and support our mutual efforts by signing the student contract.

If you have any concerns or questions, at any time, please do not hesitate to call or email me and I will respond within one school day. I can be reached at 602-496-3082 (please call before 8:15 AM or after 3:15PM) or email me at javierm@asu.edu.

Thank you for your support and your commitment to your child's education.

Sincerely,

Javier Meléndez

Physics and Mathematics Teacher

ASU Preparatory Academy - Phoenix