Course Title: AP Calculus AB

Teacher: Mr. Daniel Leven

Tutoring Hours: Tuesday, Thursday, Friday
2:30 pm – 4:30 pm

Email: dleven@sandi.net

Phone: (858) 566-2262 Ext. 4011

Website: www.levenlogic.com

Course Description:
AP Calculus AB is a college-level course designed for high school students. At most universities and colleges, a student’s ability to pass the Calculus AB exam indicates that the student has mastered a first course in Calculus. Therefore, students who pass this class will be able to:
• Work with functions whether they are presented graphically, numerically, analytically, or verbally;
• Understand and use derivatives;
• Understand and use definite integrals and Reimann sums;
• Understand the Fundamental Theorem of Calculus;
• Communicate mathematics and explain their solutions;
• Model physical situations with functions, differential equations, or integrals;
• Use technology to solve problems, experiment, interpret results, and support conclusions;
• Determine the reasonableness of solutions using various heuristics; and
• Appreciate calculus as a crowning human accomplishment.

Prerequisites:
Students should be proficient with algebra, geometry, trigonometry, analytic geometry, and elementary functions. These functions include linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise-defined functions. In particular, before studying calculus, students must be familiar with the properties of functions, the composition of functions, the algebra of functions, and the graphs of functions. Students must also understand the language of functions (domain and range, odd and even, periodic symmetry, zeros, intercepts, and descriptors such as increasing and decreasing). Students should also know how the sine and cosine functions are defined from the unit circle and know the values of the trigonometric functions at the numbers $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}$ and their multiples.

Many of these proficiencies are met by passing Advanced Math 3 with a grade of “A,” Precalculus with a grade of “B” or higher, or Honors Precalculus with a grade of “C” or higher. Students who have not met one of the above standards should consult with Mr. Leven, their counselor, and their current math teacher to assess their readiness for the class.

Textbook(s):

Supplies/Materials Recommended:
All students are expected to have:
• A pencil
• A notebook, specifically for AP Calculus AB
• A graphing calculator
A Note on Technology:
Students are expected to have a **graphing calculator** in order to complete this course. Scientific calculators or various phone applications will not be allowed on my tests or the AP test. In order to become proficient with the calculator, **students should obtain their chosen calculator as soon as possible**. If a student cannot afford a graphing calculator, he or she needs to check out a **graphing calculator** from the Media Center as soon as possible.

I will be using a Texas Instruments graphing calculator in class regularly: the **TI-84 Plus**. This is the same calculator that the school’s Media Center will provide to students. If you choose to buy a calculator, I would recommend purchasing a TI-84 for this reason. A more advanced version would be the TI-Nspire. A much more economical option would be the Casio fx-9750GII

We will be using graphing calculators in order to:
- Conduct explorations,
- Graph functions,
- Analyze the behavior of functions,
- Justify conclusions about conjectures and theorems,
- Solve equations numerically and graphically, and
- Compute approximate values of trigonometric, radical, logarithmic, and exponential expressions.

The Rule of Four:
Current mathematical education emphasizes the “Rule of Four” approach to solve problems. The four branches of problem-solving are:
- Numerical analysis (where data points are known, but not an equation)
- Graphical analysis (where a graph is known, but not an equation)
- Analytic/algebraic analysis (traditional equation and variable manipulation)
- Verbal/written methods of representing problems (classic word problems as well as written justification of one’s thinking in solving a problem)

Course Outline:
Below is an outline of topics along with a tentative timeline. Assessments are given at the end of each unit as well as intermittently during each unit. Semester finals will also be administered.

**Unit 1: Limits and Continuity (8 days)**
- A. Rates of change
  - 1. Average speed
  - 2. Instantaneous speed
- B. Limits at a point
  - 1. 1-sided limits
  - 2. 2-sided limits
  - 3. Sandwich theorem
- C. Limits involving infinity
  - 1. Asymptotic behavior
  - 2. End behavior models
  - 3. Properties of limits (algebraic analysis)
  - 4. Visualizing limits (graphic analysis)
- D. Continuity
  - 1. Continuity at a point
  - 2. Continuous functions
  - 3. Discontinuous functions
    - a. Removable discontinuity (0/0 form)
    - b. Jump discontinuity
    - c. Infinite discontinuity
- E. Rates of change and tangent lines
  - 1. Average rate of change
  - 2. Tangent lines to a curve
Unit 2: The Derivative (3 weeks)
A. Derivative of a function
   1. Definition of the derivative (difference quotient)
   2. Derivative at a point
   3. Relationships between the graphs of \( f \) and \( f' \)
   4. Graphing a derivative from data
   5. One-sided derivatives
B. Differentiability
   1. Cases where \( f'(x) \) might fail to exist
   2. Local linearity
   3. Derivatives on the calculator
   4. Symmetric difference quotient
   5. Relationship between differentiability and continuity
   6. Intermediate value theorem for derivatives
C. Rules of Differentiation
   1. Constant, power, sum, difference, product, quotient rules
   2. Higher-order derivatives
D. Applications of the Derivative
   1. Position, velocity, acceleration, and jerk
   2. Particle motion
   3. L’Hospital’s Rule
E. Derivatives of trigonometric functions
F. Chain rule
G. Implicit differentiation
   1. Differential method
   2. \( y' \) method
H. Derivatives of inverse trigonometric functions
I. Derivatives of exponential and logarithmic functions

Unit 3: Application of the Derivative (5 – 6 weeks)
A. Extreme Values
   1. Relative extrema
   2. Absolute extreme
   3. Extreme value theorem
   4. Definition of a critical point
B. Implications of the derivative
   1. Rolle’s theorem
   2. Mean value theorem
   3. Increasing and decreasing functions
C. Connecting \( f' \) and \( f'' \) with the graph of \( f(x) \)
   1. First derivative test for relative max/min
   2. Second derivative
      a. Concavity
      b. Inflection points
      c. Second derivative test for relative max/min
D. Optimization problems
E. Linearization models
   1. Local linearization
   2. Tangent line approximation
   3. Differentials
F. Related Rates

Unit 4: The Definite Integral (3 – 4 weeks)
A. Approximating areas
   1. Riemann sums
      a. Left sums
      b. Right sums
      c. Midpoint sums
      d. Trapezoidal sums
   2. Definite integrals
B. Properties of definite integrals
   1. Power rule
   2. Mean value theorem for definite integrals
C. The Fundamental Theorem of Calculus
   1. Part 1
   2. Part 2

Unit 5: Differential Equations and Mathematical Modeling (4 weeks)
A. Slope fields
B. Antiderivatives
   1. Indefinite integrals
   2. Power formulas
   3. Trigonometric formulas
   4. Exponential and logarithmic formulas
C. Separable differential equations
   1. Growth and decay
   2. Slope fields
   3. General differential equations
   4. Newton’s law of cooling
D. Logistic growth

Unit 6: Application of Definite Integrals (3 weeks)
A. Integral as net change
   1. Calculating distance traveled
   2. Consumption over time
   3. Net change from data
B. Area between curves
   1. Area between a curve and an axis
      a. Integrating with respect to x
      b. Integrating with respect to y
   2. Area between intersecting curves
      a. Integrating with respect to x
      b. Integrating with respect to y
C. Calculating volume
   1. Cross sections
   2. Disc method
   3. Shell method

Unit 7: Review/Test Preparation (time varies, generally 3 – 5 weeks)
A. Multiple-choice practice (Items from past exams – 1997, 1998, and 2003 – are used, as well as items from various review books)
   1. Test-taking strategies are emphasized
   2. Individual and group practice are both used
B. Free-response practice (Released items from the AP Central website are used liberally; solutions to these problems must include written explanations)
   1. Rubrics are reviewed so students see the need for complete answers
   2. Students collaborate to formulate team responses
   3. Individually written responses are crafted. Attention to full explanations is emphasized

Unit 8: After the Exam
A. Projects designed to incorporate this year’s learning with respect to engineering applications
B. Research projects on the historical development of mathematics with a focus on calculus
C. Advanced integration techniques
   1. Integration by parts
   2. Integration by trigonometric substitution
D. A look at college math requirements and expectations, including placement exams.

**Student Fees:**
The Constitution of the State of California requires that we provide a public education to you free of charge. Your right to a free education is for all school/educational activities, whether curricular or extracurricular, and whether you get a grade for the activity or class. Subject to certain exceptions, your right to a free public education means that we cannot require you or your family to purchase materials, supplies, equipment or uniforms for any school activity, nor can we require you or your family to pay security deposits for access, participation, materials, or equipment.

Under certain circumstances, students involved in extracurricular programs, clubs and/or sports may be required to attend fundraising events held by the program, sport or club just as you may be required to attend any other event put on by that program, club or sport. However, you will not be required to raise funds as a condition of participation.

Please visit the SDUSD Student Fees section for the completed list and additional resources by clicking here: [https://www.sandiegounified.org/node/1436](https://www.sandiegounified.org/node/1436) then click on Student Fees in the menu on the left side.

**Academic Honesty Policy:**
All students are expected to abide by the Mira Mesa High School Academic Honesty Policy which is clearly outlined in the Student & Parent Handbook as well as posted online with school registration forms for students and parents to review. In my class, students found to be cheating or plagiarizing any work will receive one or more of the following consequences:

- Option 1: A zero on the assignment
- Option 2: A penalty of one hundred (100) points to the student’s total homework grade.
- Option 3: Notification of the school’s administration and various disciplinary boards.
- Option 4: A permanent “U” for the student’s citizenship grade.
- Option 5: A permanent 0% (“F”) for the student’s academic grade.

**Class Rules and Consequences:**

**Respect** – Students are expected to respect the classroom and everyone in the classroom at all times. This includes both other students and teachers, as well as the classroom materials and equipment. Students are also required to respect everyone’s right to learn. No student may interfere with learning by causing a disruption.

**Phones** – Students are expected to have their phones in their bags or pockets at all times. These phones should be set to *silent* mode, not vibrate or ring. Phones **may not** be used as a calculator in this class.

**Prepared for Class** – Students are expected to come to class on a regular basis. Students **should be in their seats and ready to work or working when the bell rings.** Students must have their pencil, notebook, and calculator each day.

**Stay Seated** – Students are expected to remain in their seats at all times unless given permission.

**Food and Drinks** – Students should responsibly limit their food and drinks in order to maintain a positive learning environment. Students must keep their area and the room clean. Any violation of another student’s right to learn in a distraction-free and clean environment will result in a ban on all food and drink except water.
Consequences – If a student chooses to break any of the classroom rules, he or she will face any number of the consequences. The consequences will be determined based on the severity and frequency of the student’s behavior. This includes the following:

- Individual Conference
- After School Detention
- Parent/Guardian Phone Call
- Student-Parent-Teacher-Administrator Conference
- Suspension
- Expulsion

**Academic Grading Policy:**

Grades are updated at least once a week. I will post your grades in class after every test under your student identification number. Your academic grade is based on the following categories:

- **90%** of the student’s academic grade will be based on **chapter tests**
- **10%** of the student’s academic grade will be based on **assignments**

You will receive the letter grades based on the following percentages. **NOTE:** Your grade will **not** be rounded.

- **A** 90 – 100%
- **B** 80 – 89%
- **C** 70 – 79%
- **D** 60 – 69%
- **F** 0 – 59%

**Retake Policy:**

No student will be allowed to retake any exam which they have previously taken.

**Make-up/Late Policy:**

Any student who misses school is responsible for the work and learning done while they were absent. Therefore, students who are absent are required to learn the material and complete the work that they miss as soon as possible. Work that is missed will be given a score of zero (0) until it is completed. Students who miss instruction are asked to come to tutoring to see what they missed in class.

If a student has received an excused absence, I expect that the student will be able to complete the missing work in a prompt manner. Prompt will be defined on a case-by-case basis but generally means that the work will be completed the next time I see the student. Work that is submitted under these conditions will not be penalized.

If a student’s absence is not excused, or a student wishes to submit late work, the work will receive a 10% penalty on the work. Please note that a 10% penalty lowers the work by a letter grade.

**Support Policy:**

I offer both after-school tutoring Tuesday, Thursday, and Friday until 3:30 PM. I am happy to schedule other tutoring appointments if students

**Online Grade Access:**

Parents and students may view their current Academic Grade at any time through PowerSchool:

[https://powerschool.sandi.net/public/home.html](https://powerschool.sandi.net/public/home.html)
Citizenship Rubric: Citizenship will be evaluated using the Mira Mesa High School Citizenship rubric.

### MIRA MESA HIGH SCHOOL CITIZENSHIP RUBRIC FOR 2018-2019

<table>
<thead>
<tr>
<th>Citizenship</th>
<th>Attendance (Absences must be excused within 72 hours)</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E = Excellent</strong></td>
<td>• 1 or fewer uncleared tardies AND</td>
<td>The student <em>almost always</em>:</td>
</tr>
<tr>
<td></td>
<td>• No unexcused absences</td>
<td>• Participates in learning.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Follows classroom rules.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Displays on-task behaviors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Is respectful to others.</td>
</tr>
<tr>
<td><strong>G = Good</strong></td>
<td>• 2 or fewer uncleared tardies AND/OR</td>
<td>The student <em>usually</em>:</td>
</tr>
<tr>
<td></td>
<td>• No unexcused absences</td>
<td>• Participates in learning.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Follows classroom rules.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Displays on-task behaviors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Is respectful to others.</td>
</tr>
<tr>
<td><strong>S = Satisfactory</strong></td>
<td>• 3 or fewer uncleared tardies AND/OR</td>
<td>The student <em>sometimes</em>:</td>
</tr>
<tr>
<td></td>
<td>• 1 unexcused absence</td>
<td>• Participates in learning.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Follows classroom rules.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Displays on-task behaviors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Is respectful to others.</td>
</tr>
<tr>
<td><strong>N = Needs Improvement</strong></td>
<td>• 4 or fewer uncleared tardies AND/OR</td>
<td>The student <em>rarely</em>:</td>
</tr>
<tr>
<td></td>
<td>• 2 unexcused absence</td>
<td>• Participates in learning.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Follows classroom rules.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Displays on-task behaviors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Is respectful to others.</td>
</tr>
<tr>
<td><strong>U = Unsatisfactory</strong></td>
<td>• 5 or more uncleared tardies AND/OR</td>
<td>The student <em>almost never</em>:</td>
</tr>
<tr>
<td></td>
<td>• 3 or more unexcused absences</td>
<td>• Participates in learning.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Follows classroom rules.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Displays on-task behaviors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Is respectful to others.</td>
</tr>
</tbody>
</table>

Participation in learning means: Students have a pencil and notebook every day in class, ask and answer questions, complete assignments, and follow directions when asked.

Follows classroom rules means: Students are on-time to class and working when the bell rings, do not eat or drink prohibited items, and do not use prohibited electronics at any time.

Displays on task behavior means: Students are working quietly in their seats and asking questions when necessary.

Respectful to others means: Students do not disrupt the class and practice good manners.
Course Title: AP Calculus AB  
Teacher: Daniel Leven

My signature below indicates I have read and understand the policies and rules of this class and will do my best to fulfill the requirements and expectations.

Student Name (PRINT): ____________________________________________ Period: ______

Student Signature: ________________________________ Date: ________________

Parent/Guardian Name (PRINT): ____________________________________________

Parent/Guardian Signature: ________________________________ Date: ________________

I prefer to be contacted by:

☐ Phone: ________________________________

Preferred Contact Number(s)

☐ E-Mail: ________________________________

Preferred Email Address

Please Use the Space Below to Let Me Know Anything You Would Like Me to Know About You

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

If you have any questions or concerns, please contact me. The best way to contact me is via email at dleven@sandi.net