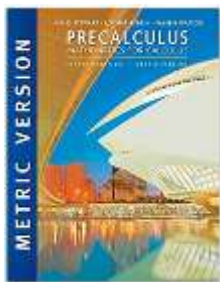


PACIFIC AMERICAN SCHOOL  
**Pre-Calculus Honors 2021~2022**  
Mon & Thurs 8:00~9:25, Wed 8:50~9:35. Room C212  
Ms. Liu

## Course Description

Welcome to Pre-Calculus! This course builds on and reinforces the topics learned in Algebra 2 with an emphasis on basic function families, transformations, and trigonometry. We will review these concepts in Semester 1 fairly quickly. In Semester 2, students are introduced to more advanced topics and the course may become more project-based with applications in physics and programming. Matrices and linear systems are extended with the study of Gauss-Jordan elimination. Honors students are introduced to concepts of linear algebra and encouraged to attempt extra credit projects that develop the algorithms they learn into coded programs. Students are also introduced to polar coordinates, vectors, and sequences and series. Pre-Calculus helps students become familiar with the technical skills and conceptual understanding needed for calculus and beyond.



## Primary Textbook and Required Materials

1. Stewart, James, Lothar Redlin, and Saleem Watson. *Precalculus*. 7th ed. International Metric Edition 2017. ISBN 9781305999985
2. Notebook for classwork, pencil, eraser, loose-leaf paper and graphing paper, folder or binder, and stapler.
3. Graphing calculator (TI-83 Plus, TI-84, TI-86, or TI-89 Titanium are recommended)

## Objectives

The learning objectives for this course are based on the National Common Core Standards and the Mathematics Content Standards for California Public Schools.

- Math is the language of science.
- Pre-calculus is foundational math, applied in business, statistics, technology, and science. Calculus is basic to college-level math, science, and engineering...
- Always wonder “why?” and try to find the answer. Could you derive the formulas? What could you apply them for? Math – you can experiment on paper!
- Practice makes perfect! Learn from mistakes.
- Enjoy!

## Tips for Success

- Practice! Homework teaches problem-solving skills. Expect a *minimum* of 30 minutes per day.
- Integrity and honesty are mandatory! Only honest effort will help you gain the understanding, speed, and accuracy needed for projects and tests. The purpose of homework is to practice and identify questions for discussion and clarification.
- Take good notes and review at home. Even a 10-minute review makes a difference.
- The best way to prepare for tests is to pay attention in class, review class examples before attempting homework, complete homework honestly by applying the techniques from the examples (like a closed-book mini self-quiz), ask questions/go back and review the patchy areas, and review once more before test day.

## Classroom Behavior Expectations

Failure to comply with the policies may result in parent conferences and/or Administrative referral. Please refer to the Student Handbook for existing guidelines.

1. Be prepared at the bell. Stationary, books, and homework should be out and ready.
2. Remain in your assigned seat and stay on task. Do not sleep in class or speak out of turn.

3. No electronics or another course's material during class.
4. Raise your hand before speaking and speak English. Respectfully listen while others are speaking. Be courteous to classmates, faculty and staff at all times.
5. Restrooms are to be used before and after class. If a student needs to leave class, he/she must get permission. Stay in the classroom during breaks.
6. Students are not allowed in lab rooms when teachers are not present.
7. Keep your work area neat and tidy. Pack up your books and stationery, remove eraser crumbs from the tabletops, and push your chair in before leaving your desk. Do not write on the tables.
8. Walk, do not run, in the lab area. Follow directions and ask permission before using classroom equipment.
9. Please keep the room clean and do not litter.
10. I am happy to help answer questions outside of class, but please gather your questions in a list beforehand and make an appointment. Also, it's best not to ask teachers during their lunch break.
11. Please keep track of pencils/pens/erasers, and use your own. There is a lost and found box.

## Course Requirements

1. Students are expected to take notes during class, participate fully in class work, review notes at home, read the textbook, and work through examples.
2. Keep an agenda book recording assignment due dates, listed on the board and class website.
3. In case of absence, students are responsible for checking the class website for announcements and new assignments, as well as reviewing a classmate's lecture notes. Missing work must be turned in within one week of the student's return.
4. An unexcused absence on a test day will result in a loss of 7 points in the make-up test. To be excused from the late test penalty, a note from the doctor or parent/guardian explaining a valid reason for absence is required on the day of return. The make-up test must be taken within one week of return.
5. Homework should be turned in on time, at the start of class. Students whose grades fall below B- or who repeatedly miss homework assignments will be noticed by the office.
6. Academic honesty is expected of all students. Homework must be completed independently.
7. Doing well on the tests does not guarantee an A+. The highest grade is only awarded if the student not only shows understanding but also is respectful, participates during lessons, and completes homework responsibly.

## Grading (Category percents are subject to change.)

### **Homework 30%**

- Due at the start of class. Late work will be deducted. Clarify understanding by asking questions during the Q&A session at the start of class.
- It is recommended to complete all the homework. At least one question in every block in every section must be tried. 'Applications', 'Discovery', 'Focus', matching, calculator, and instructions/questions on the class website cannot be skipped.
- Steps and neatness are given credit, not just the correct answer. Show work! Derive formulas when necessary, label diagrams clearly, and use proper notation
- Turn in homework on loose-leaf paper, stapled. Label with your name, the class name, homework number, and chapter/section/page at the top of the paper.

### **Tests and Projects 50%**

- No calculators during tests, except for the one short quiz on calculator usage.
- Tests are timed. Students are expected to solve questions with speed and accuracy.
- In semester 2, there may be fewer tests and more projects on advanced topics.
- Review vocabulary, formulas, notation, and concepts in notes.
- If homework is done carefully, understanding should be shown for similar questions on the test. The best way to prepare for tests is to pay attention, complete homework honestly, ask questions, and review vocabulary and the study guide before test day.
- We might be testing in another room, one student per table. I will show you your seat.

- Only a pencil, pen, eraser/white-out, and your test paper are allowed on your table. No clutter, no pencil boxes, no folders, etc.
- If I find a phone, you will automatically be deducted 10 points, especially if it was hidden in your pocket, sleeve, or pencil box. If you need to use the restroom during the test, put your phone at the front table before leaving the room.

#### **Classwork 10%**

- All problems on the board should be attempted, not just the one assigned to you.
- Animations in Desmos will help illustrate concepts.

#### **Participation 10%**

- Students should remain focused and participate fully in classwork problem-solving.
- This score will be affected by noncompliance with classroom behavior expectations, such as arriving to class late or unprepared, sleeping during or disrupting the lesson, or being off task.

**Bonus Points**- available on homework, quizzes, and exams

## Course Outline

### Quarter 1

#### **Chapter 1: Basic Concept Review (3 weeks)**

- Algebraic expressions
- Lines, modeling, variation

#### **Chapter 2: Functions in General (3 weeks)**

- What is a function?
- Lines and parabolas
- Transformations (translation, reflection, stretching)
- Symmetry, invertibility, periodicity.
- Library of special functions: linear, quadratic, (general quadratic: conic sections), polynomial, rational functions, trigonometric, transcendental functions (exponential and logarithmic, inverse trigonometric).

#### **Chapter 3: Polynomials and rational functions (3 weeks)**

- Polynomials (division, root theorems, Fundamental Theorem of Algebra)
- Complex numbers
- Rational Functions (Quotient of two polynomials, Asymptote, Limit)

### Quarter 2

#### **Chapter 4: Exponential and Logarithmic Functions (3 weeks)**

#### **Definition of Trigonometric Functions (2 weeks)**

- Right angle trigonometry (6.1~6.3)
- Unit circle trigonometry (5.1~5.3)

#### **Graphing Trigonometric Functions (1.5 weeks)**

- Trigonometric graphs (5.3~5.4)
- Simple Harmonic Motion (5.6)
- Inverses (5.5, 6.4)

### Quarter 3

#### **Chapter 7: Trigonometric Identities (2 weeks)**

#### **Trigonometry and Applications (2 weeks)**

- Traveling and standing waves (Ch. 7 focus on modeling)
- Law of Sines and Cosines (6.5~6.6)
- Surveying (Ch. 6 focus on modeling)

#### **Chapter 8: Polar Coordinates and Parametric Equations (3 weeks)**

#### **Chapter 9: Vectors (2 weeks)**

- 2D vectors and Dot Product (9.1~9.2)
- 3D if time permits (9.3~9.6)

- Plane curves and parametric equations

## Quarter 4

### **Chapter 10: Linear Systems (4 weeks)**

- Systems of linear equations
- Matrices, inverses, determinants, Cramer's rule, Gauss-Jordan elimination
- Partial Fractions
- Systems of inequalities

### **Chapter 12: Sequences and Series (1.5 weeks)**

- Sigma notation
- Arithmetic and geometric sequences and series
- Sets, logic, induction (12.5)
- Pascal's Triangle and the Binomial Theorem with proofs (12.6)

### **Chapter 13: Introduction to Calculus (1.5 weeks)**

- Limits (13.1,13.2, 13.4)
- Difference Quotient (13.3)
- Riemann Sum (13.5)
- Arithmetic and geometric sequences and series

### **Chapter 11: Conic Sections (2.5 weeks)**

- Parabolas, ellipses, hyperbolas review
- Rotation of axes
- Polar equations of conics