

PACIFIC AMERICAN SCHOOL  
**AP Physics C 2021~2022**  
Tue & Fri 11:00~12:35. Room S203.  
Ms. Liu

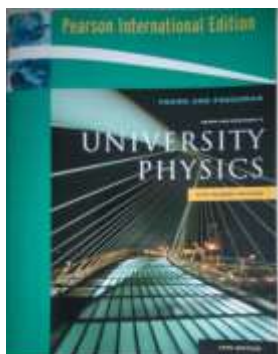
## Course Description

Welcome to the wonderful world of physics! AP Physics C is a college-level course focusing on mechanics and electromagnetism. Topics include linear and rotational dynamics and an in-depth treatment of electromagnetism. Material is covered with calculus-based derivations and experimentation at the foundational level expected of science and engineering majors. Students are required to take two AP Physics Exams in May: (1) Mechanics and (2) Electricity and Magnetism. Scores of 4 or 5 on these standardized tests may enable students to earn three quarters of college credit. Course credit policies vary by institution.

## Objectives

The learning objectives for this course are based on the Next Generation Science Standards, Science Content Standards for California Public Schools, and the College Board AP Course Description.

- First-year physics provides a solid foundation for scientists and engineers.
- Calculus is the language of physics.
- Students will develop creativity and reasoning skills in order to interpret physical concepts, apply scientific methods to conduct experiments and obtain reasonable conclusions, and use mathematical modeling to analyze phenomena.
- Practice makes perfect! Learn from mistakes.
- Always wonder “why?” and try to find the answer. Could you derive the formulas? What could you apply them for?
- Do well on the AP Exams: **12 noon(Mechanics) and 2 p.m. (E&M), Tuesday, May 10, 2022**
- Enjoy physics!



## Primary Textbook and Required Materials

1. Young, Hugh D., Roger A. Freedman, and A. Lewis Ford. *Sears and Zemansky's University Physics with Modern Physics*. 12<sup>th</sup> Edition. Pearson Education, 2008. ISBN: 9780321501301
2. Notebook for classwork, stapled loose-leaf paper for homework.
3. Lab folder
4. Graphing calculator (TI-83 Plus, TI-84, or TI-89 are recommended)

## References

1. Giancoli, Douglas C. *Physics: Principles with Applications*. 7<sup>th</sup> Edition. Pearson Education, 2014
2. Serway, Raymond A., Robert J. Beichner, and John W. Jewett, Jr. *Physics for Scientists and Engineers*.
3. Sample Free Response and Multiple Choice Questions, Course and Exam Information.

Mechanics Exam:

[http://apcentral.collegeboard.com/apc/members/exam/exam\\_information/8039.html](http://apcentral.collegeboard.com/apc/members/exam/exam_information/8039.html)

Electricity and Magnetism Exam:

[http://apcentral.collegeboard.com/apc/members/exam/exam\\_information/2008.html](http://apcentral.collegeboard.com/apc/members/exam/exam_information/2008.html)

## 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 have a hall pass. 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. Clean up your lab station before leaving.
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. Before starting an experiment, complete a pre-lab including your question, hypothesis, procedure, and chart set-up for data collection.
2. Students are expected to take notes during class, review notes at home, and read the textbook.
3. Keep an agenda book recording assignment due dates, listed on the board and class website.
4. 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.
5. 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.
6. Homework should be turned in on time, by the start of class. Late work will have a penalty.
7. This is a college-level course which requires a significant commitment in time to maintain quality work. All students begin with a probationary period in the first three weeks of the course. Students whose grades fall to B- or below at any time in the year may be required to drop the course. Please review the school policy on AP courses in the Student Handbook.
8. Students who list an AP course on college applications are required to take the AP Exam in May. They may not cancel the AP Exam score or later drop the course. Unexcused absence from the AP Exam will result in a course grade of zero.
9. Academic honesty is expected of all students. Homework must be completed independently.
10. AP Physics C is an intensive calculus-based course. In order to ensure mastery of the material and to allow for sufficient lab time, students will be required to attend extra after school lessons if necessary. Students may also be asked to work on AP Physics C material (lab work or tests) during study halls.

## PAS AP Expectations

*AP courses are designed for the purpose of obtaining university credit while still attending high school. PAS has a high expectation of student performance, in line with the obvious rigor of such courses. Therefore, all students enter AP courses on a probationary basis. Student performance will be evaluated by both the AP subject teachers and the school administration along the following lines to determine a student's fitness for continuing the course.*

*Stage 1 – AP Courses begin during the summer; completion and effort of the assigned summer work prior to beginning of the school year will be evaluated to determine initial concerns.*

*Stage 2 -- any concerns that have arisen, particularly in regard to effort and participation, by the add/drop deadline.*

*Stage 3 -- the end of Quarter 1. Any student achieving a grade below "B-" will be automatically removed from the course. Any student achieving a "B-" will be given a warning, and face additional scrutiny in the subsequent quarters.*

*Stage 4 -- the end of Quarter 2. Any student warned at the end of Quarter 1 who has not raised his/her grade above "B-" will be removed from the course.*

*After Quarter 2, if a student's grade drops to a "B-" or below he/she will be removed from the course. If the student is a senior and has already been accepted by a university, the administration will notify said university of the student's changed status and may recommend reconsideration of the student's acceptance on that basis. For students removed from an AP course according to the condition below, there is an option to appeal to the relevant AP teacher and the school administration, in exceptional cases.*

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

### **Homework 30%**

- Due at the start of class. Late work receives a score of zero.
- 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.
- Homework is assigned with a list of recommended problems. At least the minimum should be completed: At least one problem from each section should be tried. Online AP Classroom material that are assigned are mandatory.
- Work and neatness are graded, not just the correct answer. Explain concepts clearly, showing formulas or diagrams when necessary.
- Include SI units.
- Turn in homework on loose-leaf paper, stapled. For each assignment, label the homework number, chapter/section number, and page number at the top of the page.

### **Tests 50%**

- Unit tests cover approximately 3 chapters.
- Large exams such as the Semester 1 Final and Semester 2 Midterms may be weighted as 2~3 test grades.
- Take good notes and review at home. The best way to prepare for tests is to pay attention,

complete homework honestly, ask questions, and review class examples before test day.

- Test corrections are mandatory, to be done outside of class time. Please make an appointment.
- Clear your desk of all clutter. Only a pencil/pen, eraser/white-out, your test paper, and calculator are allowed on the table. Put away pencil boxes and phones. If you need to use the restroom during the test, put your phone at the front table before leaving the room.

### **Class Participation 20%**

- Worksheets and student notebooks containing notes and examples may be checked for completion.
- 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. Students should speak English on campus.
- Your notebook will also be used as an inquiry “wonder why” journal in which topics for further independent research are listed. You will write short paragraphs describing how you would design experiments to answer your questions. Please do not cross out or white out any work in your lab notebook. Show all attempts and raw data. The lab should follow the format shown below.

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

## Lab Report Format

1. Include the date, your name, and the names of your lab partners.
2. Title
3. Objective/Question – What is the goal of this lab? This should be clear and concise.
4. Hypothesis – Make an educated guess to answer your question. Include background information and derivations with cited references.
5. Independent, Dependent, and Controlled Variables –
  - a. Independent variables are manipulated, input conditions that affect the outcome of your experiment.
  - b. Dependent variables are responding, output conditions that you measure.
  - c. Controlled variables are other factors that could affect your measurements. You need to control them so that your data is not biased.
6. Procedure – Provide step-by-step instructions on how you conducted your experiment so that others can replicate your results. Labeled diagrams and pictures should be included. Throughout

the year you should develop skills on how to design an experiment and to use the proper tools and methods for measurements.

7. Data – Measurements should be recorded neatly in tables, charts, and graphs. Be sure to have more than one trial, indicate SI units, and use significant figures appropriately.
8. Analysis – This is a very important part of the lab report.
  - Explain your observations using scientific principles. If calculations are included, clearly show what formulas you are using and cite references if necessary. Do your results support your hypothesis? Why or why not?
  - Were there any errors? Distinguish between blunders and experimental errors. How could you improve your procedure to prevent them or to improve precision next time?
9. Conclusion – Briefly summarize the lab's goal and how your results support or contradict your hypothesis. How could your results benefit society? What further research could be done on the topic?

## Course Outline

### Quarter 1

Unit 1: Review of Kinematics and Newton's Laws (2.5 weeks)

Chapter 1: Units of Measurement

Chapter 2: Linear Motion

Chapter 3: 2D Motion

Unit 2: Review of Newton's Laws and Gravity (3 weeks)

Chapter 4: Newton's Laws

Chapter 5: Applying Newton's Laws

Chapter 12: Gravitation

Unit 3: Work, Energy, Momentum (3.5 weeks)

Chapter 6: Work and Kinetic Energy

Chapter 7: Potential Energy and Energy Conservation

Chapter 8: Momentum, Impulse, and Collisions

### Quarter 2

Unit 5: Simple Harmonic Motion (1.5 weeks)

Chapter 13: Periodic Motion

Unit 4: Rotational Motion and Equilibrium (3.5 weeks)

Chapter 9: Rotation of Rigid Bodies

Chapter 10: Dynamics of Rotational Motion

Chapter 11: Equilibrium

Unit 6: Electrostatics (4 weeks)

Chapter 21: Electric Charge and Electric Field

Chapter 22: Gauss's Law

Chapter 23: Electric Potential

## Quarter 3

Unit 7: Circuits (3 weeks)

Chapter 24: Capacitance and Dielectrics

Chapter 25: Current, Resistance, and Electromotive Force

Chapter 26: Direct-Current Circuits

Unit 8: Electromagnetism (4 weeks)

Chapter 27: Magnetic Fields and Forces

Chapter 28: Sources of Magnetic Field

Chapter 29: Electromagnetic Induction

Chapter 30: Inductance

## Quarter 4

Unit 9: AP Exam Preparation (4 weeks)

Unit 10: After-AP Activities (2 weeks)

Chapter 31: Alternating Current

Chapter 32: Electromagnetic Waves