

PACIFIC AMERICAN SCHOOL
AP Physics 1~2 2021~2022

Mon & Thurs 11:00~12:35, Wed 11:20~12:50. Room S203.

Ms. Liu

Course Description

Welcome to the wonderful world of physics! AP Physics 1~2 is an algebra-based course satisfying university requirements for life science majors and providing a useful conceptual foundation for engineering majors. Concepts, experiment design, and problem-solving ability are emphasized. This is an intensive course with a lot of breadth as well as depth. AP Physics 1 corresponds to a first semester university physics course including the topics of classical mechanics, rotational motion, oscillations and waves, and introductory electrostatics and DC circuits. AP Physics 2 corresponds to a second university semester including topics of fluid mechanics, thermal physics, electromagnetism, waves and optics, and atomic and nuclear physics. Students are required to take the AP Physics 1 and/or 2 Exams in May. Scores of 4 or 5 on these standardized tests may enable students to earn college credit. Course credit policies vary by institution. Juniors planning to major in science or engineering and who complete this course and AP Calculus AB are encouraged to take the calculus-based AP Physics C the following year.

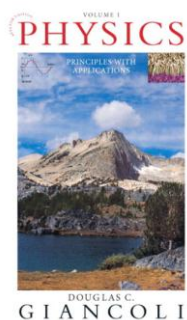
Objectives

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.
- Math 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?
- Enjoy physics!
- Do well on the AP Exams:

AP Physics 1: 12 noon, Thursday, May 12, 2022

AP Physics 2: 12 noon, Friday, May 13, 2022



Primary Textbook and Required Materials

1. Giancoli, Douglas C. *Physics: Principles with Applications*. 7th Edition. Pearson Education, 2014. ISBN: 978-0-321-62592-2
2. Notebook, pencil, eraser, loose-leaf paper and graphing paper, folder or binder, and stapler
3. Lab book

References

1. Giancoli Physics Companion Website <http://physics.prenhall.com/giancolippa>
2. Sample Free Response and Multiple Choice Questions, Course and Exam Information.
AP Physics 1 Exam:
http://apcentral.collegeboard.com/apc/members/exam/exam_information/225288.html
AP Physics 2 Exam:
http://apcentral.collegeboard.com/apc/members/exam/exam_information/225439.html
AP Physics B FRQs
http://apcentral.collegeboard.com/apc/members/exam/exam_information/2007.html
3. Anton Hewitt, Lyons, Suchocki, and Yeh. *Conceptual Integrated Science Explorations*. Pearson Education, 2010.
4. Young, Hugh D., Roger A. Freedman, and A. Lewis Ford. *Sears and Zemansky's University Physics with Modern Physics*. 12th Edition. Pearson Education, 2008.
5. Serway, Raymond A. and Jerry S. Faughn. *Holt Physics*. Holt, Rinehart and Winston, 2006.

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 not be accepted and will receive a score of zero.
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 1~2 was designed by the CollegeBoard as a two-year course in order to encourage depth of understanding and to allow time for open-inquiry labs. Since our school continues with the AP Physics B tradition of completing the coursework in 1 year, students will be required to attend several extra after school lessons due to time constraints. Students may also be asked to work on AP Physics 1~2 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.
- Homework is assigned with a list of recommended problems. At least the minimum should be completed: All assigned MisConceptuals should be attempted. Most Questions should be tried. At least one problem from each section and most General Problems should be tried.
- Online AP Classroom material that are assigned are mandatory.
- 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.
- Work and neatness are graded, not just the correct answer. When asked to "explain" or

“describe”, please do not give one-word answers. 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.
- One student per table. I will show you your seat.
- 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.
- Only the bare calculator is allowed, without the shell/cover. Cell phones may not be used as calculators. If I find a phone, you will automatically be deducted 10 points, especially if you hid it 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.

Class Participation 20%

- Worksheets
- Student notebooks containing notes and class examples may be checked for completion.
- This notebook will also be used as an inquiry “wonder why” journal in which topics for further independent research are listed. The new AP Exam emphasizes concepts and experiment design, so you will also 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 report should follow the format shown below.
- 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. Speak English on campus.

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

Modern Physics (2 weeks, continuing HS Physics and summer homework)

26. The Special Theory of Relativity (introductory/qualitative)

27. Early Quantum Theory and Models of the Atom
30. Nuclear Physics and Radioactivity (summarized introduction)
31. Nuclear Energy; Effects and Uses of Radiation (summarized introduction)
28. Quantum Mechanics of Atoms (optional)
29. Molecules and Solids (optional)
32. Elementary Particles (optional)
33. Astrophysics and Cosmology (optional)

Kinematics (1 week)

1. Introduction, Measurement, Estimating
2. Describing Motion: Kinematics in One Dimension
3. Kinematics in Two Dimensions; Vectors

Forces and Gravity, Energy and Momentum (6 weeks)

4. Dynamics: Newton's Laws of Motion
5. Circular Motion; Gravitation
6. Work and Energy
7. Linear Momentum

Quarter 2

Rotational Motion and Static Equilibrium (2.5 weeks)

8. Rotational Motion (Extra Class PD: October)
9. Static Equilibrium; Elasticity and Fracture

Mechanical Waves (2 weeks)

11. Oscillations and Waves
12. Sound

Fluid Dynamics and Thermodynamics (3 weeks)

10. Fluids
13. Temperature and Kinetic Theory (Extra Class PD: November)
14. Heat
15. The Laws of Thermodynamics (Extra Class: December)

Electrostatics (2 weeks)

16. Electric Charge and Electric Field
17. Electric Potential (Extra Class: January)

Quarter 3

Semester 2 Begins: Circuits (2 weeks)

18. Electric Currents
19. DC Circuits

Electromagnetism (3 weeks)

20. Magnetism
21. Electromagnetic Induction and Faraday's Law
22. Electromagnetic Waves (introductory)

Light and Optics (4 weeks)

23. Light: Geometric Optics
24. The Wave Nature of Light (Extra Class PD: March)
25. Optical Instruments (optional)

Quarter 4

AP Exam Preparation (4 weeks)

Laboratory Fun (3 weeks)