

AP Physics 2 Syllabus
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Text:

College Physics – 7th Edition. Wilson, J. and Buffa, A. San Francisco, CA: Addison-Wesley.

Course Overview:

AP Physics 2 is a college level introductory physics course covering the general topics of thermodynamics, fluid mechanics, electricity (electric potential, capacitance, RC circuits), magnetism, geometric and physical optics, and quantum & atomic physics. All students are encouraged to take the AP Physics 2 test at the end of the school year. High scores can be applied to many colleges for credit.

AP Physics 2 requires a thorough understanding of algebra 2 and trigonometry. The course is recommended for students who are planning to be pre-med majors in college, as a foundation course for students who are planning to be engineering or physics majors and will take a calculus-based physics course as college freshmen, or for non-physics majors who want to get some core college science credits in high school so that they can take other classes as college freshmen. This course will be covered in a full year. The emphasis of this course is to understand the concepts of physics, and use them to formulate and solve real world problems. Hands-on inquiry based lab work is presented as an integral part of this course. A topical unit assessment completes each unit. There is a cumulative final exam at the end of each semester.

Physics class will typically meet 4 days a week, for approximately 270 minutes total. Collaboration between students, including peer teaching and review, is strongly emphasized. Students are encouraged to work together on homework assignments, labs, and projects.

Course goals include developing each student's intuition, creativity, and investigative skills to:

- A. Read, understand, and interpret physical information.
- B. Use the scientific method to analyze a particular physical phenomenon or problem.
- C. Use mathematical reasoning in a physical situation or problem.
- D. Perform experiments, interpret the results of observations and communicate results, including error analysis.

Grading Policy: Approximate Point Percentage Scale.

Assessments (Tests & Quizzes)	35%
Labs	25%
Homework	15%
Final Project	10%
Final Exam	15%
Total:	100%

Grade	Percent
A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%

Assessments (Tests and Quizzes):

There are several unit tests each semester, as well as proficiency quizzes covering concepts within individual units. I allow students to use their **resource section only** of their Booklets for regular tests, and any hand-written notes on tests and quizzes.

Labs:

1. All labs require data acquisition and written responses made in your Lab Notebook (provided). I will check your lab work off when I collect Booklets at the end of a unit.

2. Some labs are more detailed and require a more formal product turned in to me. The details of these products will be given in every lab where they occur.

For any lab, I will offer a question and answer session after all groups have finished their data collection, and before the lab is due. This most likely will occur at the start of next class.

Homework Checks:

Daily Booklet Homework: 3 to 8 problems follow a section of notes, and are scored at the end of a unit. I will forewarn all students before collecting or checking Booklets. Early Booklets receive extra credit. Students are welcome to ask questions on specific problems the day after they're assigned.

Unit Review Problems: students should work on them during the course of the unit, and fill in the bubble sheet once the questions have been answered. On the due date, I will collect booklets and scan them. I will indicate which ones were missed and write down scores, then return Booklets.

If a student is late submitting answers to a Unit Review Problem set, there is a 50% reduction in score. Also, if all work is not shown on problems, an incomplete fee will be assessed per problem.

Spring Semester Project

Working in small groups (2 or 3), students will be given a research topic or project that presents a real world problem to solve.

After compiling findings and making adjustments as a team, groups will present their projects to the class. The audience members of the class will then cross-examine the presenters, to ascertain that their solutions to the different topics are defensible. Presenting groups, as experts on their problems, should provide counter arguments, and supporting evidence as needed to defend their findings.

Semester Final:

The comprehensive semester final is worth 15% of your grade. You can use your **entire** Booklet, as well as any **hand-written** notes you have taken during the semester.

Redo Policy:

Students have the option of redoing any incorrect answers on Booklet assignments and labs for at least 50% credit back. For example, if a student missed six points on an assignment and does all corrections, s/he will earn three points back. Corrections must be done within **two weeks** of a Unit Test.

In order to redo a test or quiz, students correct **all** their mistakes on a separate sheet of paper (or on the original if there's room), staple it to the original, and give that to me for review. Problems must be reworked, and answered completely. For example, don't just write A, B, C, or D for multiple choice, explain your correction thoroughly. They may then take another version of the test within **two weeks** of that Unit Test. The best score will be recorded.

Late Work:

You will be told exactly when assignments are due. Work submitted after due dates will be accepted up to two weeks after a unit test, with a late fee. After this two week period, late work will not be accepted. No late work will be accepted after the last day of regular instruction (just before finals).

Attendance:

It is your responsibility to ask for any work missed due to excused, unexpected absences when you return. Alternatively, if you are keeping track of where we are in the semester in the Semester Plans portion of your Booklet, you'll have a fair idea as to what you'll be missing. Assignments you miss are due upon your return. Missed labs must be made up within two weeks of your return.

Class Expectations and Repercussions:

At this stage in your development, I consider being a student to be your principal occupation: treat this class as a serious job in which I am your boss:

1. Be in class on time, with all necessary materials.
2. Show respect to all people in the class, as well as the classroom itself.
3. While all school and district rules must be followed, I emphasize:
 - a. No hats, hoods, or headgear,
 - b. Wear school and science lab appropriate clothing,
 - c. Leave all backpacks and large purses in your locker,
 - d. Have a hall pass or an escort to leave the room,
 - e. Devices are permitted **ONLY** if they are used in a scholastic context.

Not meeting expectations will result in the following tracked repercussions:

1. Verbal reminder of what is expected,
2. Second verbal reminder
3. Third verbal reminder and one lunch detention
4. Fourth verbal reminder, two lunch detentions, and guardian contact.
5. Office referral.

Supply List:

School issued: textbook, Homework Booklet, Lab Notebook
Writing sticks (pens / pencils),
3-Ring binder with paper OR spiral notebook,
Scientific Calculator (recommended)

A note on calculators:

Calculators (but not cell phone ones!) may be used on most tests and quizzes. Also, if you plan on going further academically, consider purchasing your own graphing calculator and use it as long as you have it. Consider it an investment.

A classroom set MAY be available, but these must not leave the classroom.

Preparation for AP Test; Grading Considerations

Many students take AP classes to earn advance credit in college classes they intend to take. At the end of the school year, the College Board provides a test that students can take to earn credit. It is not required that students take this test to pass AP Physics 1. It is completely optional. I recommend it for students who feel comfortable with their understanding of physics by the time registration season comes, because most colleges accept AP test results. We will talk more about registration and the AP test later.

To prepare students for the AP test, this booklet contains problems that are in the format of an AP question. The multiple choice questions will have one or two correct answers, and the free response questions are taken from old AP tests. In class, these AP format questions are labeled, and we will go over each one as we encounter them.

As far as grade value is concerned, AP classes weigh on your transcripts differently than standard classes. An 'A', for example, rather than counting towards your GPA as a 4.0, will count as a 5.0. A 'B' counts as a 4.0; a 'C' a 3.0, and a 'D' is a 2.0. An 'F' is still 0.0.

Big Ideas Concept:

The AP program Physics format focuses on recurring fundamental themes called Big Ideas. As students progress through different topics, they will be reminded of these themes so they recognize the interworkings of systems in the universe, from the level of the very small to the very large.

The six Big Ideas featured in AP Physics 1 are:

1. Objects and systems have properties such as mass and charge. Systems may have internal structure.
2. Fields existing in space can be used to explain interactions.
3. The interactions of an object with other objects can be described by forces.
4. Interactions between systems can result in changes in those systems.
5. Changes that occur as a result of interactions are constrained by conservation laws.
6. Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

Course Outline:

The following list is the expected sequence of topics and assignments that students will experience during the year. Each topic is anchored to one or more of the Big Ideas mentioned earlier.

Spring Semester:

Unit 3 Continued – DC and RC Circuits – Big Ideas 1, 2, 3, 4, 5

3.C – Electric Current and Resistance

1. Notes 3.C.1 – Batteries, Direct Current, and the Ampere
2. Notes 3.C.2 – Resistance & Resistor Circuits
→ Resistor Circuit Challenge
3. Notes 3.C.3 – Ohm’s Law
→ Mystery Resistor Challenge
4. Notes 3.C.4 – Power
5. Notes 3.C.5 – RC Circuits
→ Resistor/Capacitor Circuit Lab

(Notes 3.C.?? - Kirchoff’s Laws – (Add in 2017???)

- Unit 3.C Application Problems
- Unit 3.C Review Problems
- Unit 3.C Test and Booklet Check

Unit 4 – Magnetism – Big Ideas 1, 2, 3, 5

1. Notes 4.1 – Permanent Magnets, Poles, Magnetic Field Direction
2. Notes 4.2 – Magnetic Field Strength, Force
→ Magnetic Properties Lab
3. Notes 4.3 – Particles in Magnetic Fields, Current Carrying Wires
4. Notes 4.4 – Electromagnetism
→ Electromagnet Lab
5. Notes 4.5 – Electromagnetic Induction, Faraday’s & Lenz’ Laws,
6. Notes 4.6 – Generators, Back EMF, Transformers
→ Unit 4 Application Problems
→ Unit 4 Review Problems
→ Unit 4 Test and Booklet Check

Optional Items (2017)

1. Buoyancy Lab Part 2 – Clay Boat Challenge
2. Double Mousetrap Lab – Two times the power!!!

Unit 5 – Geometric and Physical Optics – Big Idea 6

5.A – Light, Reflection, and Refraction

1. Notes 5.A.1 – Electromagnetic Waves
2. Notes 5.A.2 – Reflection
→ Plane Mirror Lab
3. Notes 5.A.3 – Refraction, Optical Phenomena
→ Refractive Index of Vegetable Oil Lab
→ Shooting Fish in a Barrel Challenge
→ Unit 5.A Application Problems
→ Unit 5.A Review Problems
→ Unit 5.A Test and Booklet Check

Practice AP Exam 1 – Check for student preparedness – do you really want to register for the Test?
Spring Break

5.B – Geometric Optics

1. Notes 5.B.1 – Plane Mirrors
2. Notes 5.B.2 – Spherical Mirrors
→ Spherical Mirror Lab
3. Notes 5.B.3 – Lenses and Aberrations
→ Unit 5.B Application Problems
→ Unit 5.B Review Problems
→ Unit 5.B Test and Booklet Check

5.C – Physical Optics

1. Notes 5.C.1 – Young’s Double Slit Experiment
2. Notes 5.C.2 – Thin Film Interference
3. Notes 5.C.3 – Diffraction
→ Diffraction Lab
4. Notes 5.C.4 – Polarization and Scattering
→ Unit 5.C Application Problems
→ Unit 5.C Review Problems
→ Unit 5.C Test and Booklet Check:

Unit 6– Modern Physics – Big Ideas 1, 3, 4, 5, 6, 7

1. Notes 6.1 – Quantum Physics: The Photoelectric Effect
2. Notes 6.2 – The Compton Effect
3. Notes 6.3 – Atomic Physics
4. Notes 6.4 – Wave - Particle Duality
5. Notes 6.5 – Nuclear Decay
6. Notes 6.6 – Half-Lives and Stability
→ Radioactive Decay Lab
7. Notes 6.7 – Mass-Energy Equivalence
8. Notes 6.8 – Relativity???????????? – If Time Permits
→ Unit 6 Application Problems
→ Unit 6 Review Problems
→ Unit 6 Test and Booklet Check:

Heading Down the Backstretch

- Intense AP Exam Review
- Spring Semester Project Presentations
- Spring Semester In-Class Review and Study Guide
- Spring Semester Final Exam