



Course Syllabus

AP Physics | 2020-2021

Objective: The purpose of this course is to prepare the student for the AP Physics 1 Exam. After completing this course, the student should be knowledgeable in all the areas covered on the exam. We will only cover the topics on the AP Physics Exam. In particular we will not cover Fluid Dynamics, Thermodynamics, Relativity, Quantum Mechanics, Nuclear Physics, or Astrophysics.

Prerequisites: Competent understanding of a physical Science course is expected of students enrolled in this course. Algebra 2/ Trigonometry is required. Precalculus is optional but would be helpful.

Instructor Contact Information:

Primary Instructor: Larry McMahan, Ph.D. larry.mcmahan@fremontstem.com

Website:

All course materials (waiver, syllabi, etc.) will be posted on the course website under “AP Physics.” Class material will be uploaded to the Google classroom for AP Physics 1 (classroom.google.com). This includes a copy of the textbook, PowerPoint slides on each topic, and assignments.

Class Times:

Lecture and Labs: Sundays 7:30 – 9:00 PM

Assistance:

Assistance may be requested by emailing the instructor at larry.mcmahan@fremontstem.com.

Required Materials:

- Notebook for taking notes
- Folder for handouts, worksheets, etc.
- Calculator
- Pencils, erasers, etc.

Program Cost: \$575 for the course.

Note: the full program cost is due on the first day of lecture, either in person (cash/check) or via Paypal online. If the student for some reason must miss the first day, the fees must be paid by the first attended lecture. The program fee is non-refundable unless unexpected and severe circumstances arise.

Books and Course Material: The course will use Physics, Principles with Applications, by Douglas Giancoli. A copy will be posted in the classroom. In addition, a PowerPoint presentation of each topic will be posted. There are 11 topics on the AP Exam list, plus an additional topic of interest (Light and Optics)



Homework: Homework that is assigned is entirely **optional**. Answer keys will be available online the day the homework assignment is due. For help on practice problems, feel free to email Dr. McMahan.

Quizzes: In order to keep everyone up to speed on the material being covered, online quizzes will be assigned after each lesson. These are short (15 minutes) and will cover the most recent lecture's material. Please feel free to use any course materials to complete the quiz. Quizzes are accessible on the course website.

Textbooks:

Primary text:

Physics, Principles with Applications, by Douglas Giancoli.

Supplemental Text: PowerPoint slides on each of the topics.

You may also optionally purchase **Barron's AP Physics 1**.

Lab safety: Safety is of first priority. All students and parents are expected to have read and understand the Lab Safety and Liability waiver. This form is sent out in the registration email and must be turned in before the first day of lab. 5 Physics labs will be used to demonstrate the effect of physical laws and principals. Due to the special equipment required the circuits lab and the momentum lab will be demonstrated by the teacher and the students will collect data and do calculations. For the other labs, the students will be given a list of ordinary materials to collect for the lab and will duplicate the experiment. **Due to CoVid19 requirements, all labs the first semester will be held virtually on-line. A decision will be made for the second semester during the winter break.**

Notes: Please bring a notebook and pencil to take notes. This is not graded or collected, but it is a good habit to always take notes in any class for future reference, studying, or staying awake during lecture.

Exams: The AP Examination for Physics 1 will be held on May 5, 2021. A practice AP Test Exam will be given in-class on May 2. Material taught after May 5 will not be on the AP Exam and will not be grades as heavily. Assignments on the material will continue to be given

Tentative Nature of the Syllabus: The contents of this syllabus and attached schedule are tentative in nature and may be subject to change or revision. The instructor holds the right to make changes to the schedule and/or organization of the class as necessary. Students and parents will be identified of any changes via email. In particular, topic order may vary from school to school. I will adjust the order in which topics are taught to ensure we cover the material concurrently with the schools.

Special Accommodations: If your student requires special accommodations, please notify the instructor as soon as possible.

Tentative Schedule *Assignments are noted in italics.*

Date	Topic
Sep 13 – Sep 20	1. Units, Measurement and Estimation - SI System of measurement, Order of magnitude estimates, converting units
Sep 27 – Oct 11	2. Kinematics - Motion in one and two dimensions. Average and instantaneous velocity, acceleration, velocity and position graphs, velocity vectors, projectile motion, relative velocity, gravitational acceleration lab
Oct 18 – Nov 1	3. Dynamics - Forces, Newtons laws of motion, gravity, weight, and the normal force. Friction
Nov 8 – Nov 15	4. Circular Motion and Gravitation - Circular kinematics and dynamics, Banked curves, Newton's law of Universal Gravitation, Kepler's laws of planetary motion. Centripetal acceleration lab.
Nov 29 – Dec 13	5. Work, Energy, and Power - Work done by constant or variable force, Potential and Kinetic energy, Conservation of energy, dissipative forces, Power
Jan 3 – Jan 17	6. Momentum and Impulse - Relation to force, conservation of momentum, conservation of energy and momentum in collisions. Elastic and Inelastic collisions, center of mass. Elastic and inelastic collision lab.
Jan 24 – Feb 7	7. Rotation, Torque, and Angular Momentum - Angular acceleration, rolling motion, Torque, Rotational Kinetic energy, rotational kinetic energy, conservation of angular momentum
Feb 14 – Feb 28	8. Uniform Harmonic Motion - Spring oscillators, pendulum, damped harmonic motion. Uniform Harmonic motion lab.
Mar 7 – Mar 21	9. Waves, vibration, and sound - wave motion, types of waves, standing waves, sound intensity, harmonics, interference, doppler effect
Mar 28 – Apr 18	10. Electrostatics - Charge and its conservation, Coulomb's law, potential due to point charge, superposition of charges, electric fields
Apr 25 – May 2	11. Electric current (DC) - electric potential, resistivity and resistance, Ohm's law, DC circuit analysis with resistors or capacitors, Kirchhoff's laws, RC circuit analysis. RL Circuits, RC Circuit lab.
May 9 – Jun 6	12. Light and Optics - particle or wave?, photoelectric effect, diffraction, absorption, reflection, refraction, Snell's law, lenses and mirrors, concave and convex lenses and mirrors, thin lens equation, magnification. lens power

**Note: Lecture and lab days are subject to change if unexpected circumstances arise.*