2024 – 2025 AP Physics 1 Syllabus

Dr. Anthony Lau, Rm 225
Conference: 10:15 to 11:15 am, 4th period
Tutorials: TBA

Mr. Chad Bishop, Rm 221
Conference: 10:15 to 11:15 pm, 4th period
Tutorials: TBA

Textbook:

Knight, R, Jones, B. and Field, S. *College Physics: A Strategic Approach*. 4th Edition. Boston, MA: Pearson Education.

About this course:

The AP Physics 1 course will meet for 50 minutes every day. Lab work is integral to the understanding of the concepts in this course. The AP Physics 1 course has been designed by the College Board as a course equivalent to the first semester of an algebra-based college-level physics class. At the end of the course, students will take the AP Physics 1 Exam, which will thoroughly test their understanding of the topics taught in the classroom. Topics covered in the course are based on the six out of the seven "Big Ideas" as listed in the ***AP Physics 1 and 2 Course Description***, published and found on College Board's AP Physics 1 home page.

The course focuses on applying 10 different scientific practices to learn about the various concepts in physics. These 10 practices can be found on page 14 of the ***AP Physics 1 and 2 Course Description***, which is published and found on College Board's AP Physics 1 exam page.

Evaluation:

Students will receive grades on homework, quizzes, laboratory work, projects, and exams. Exams are typically worth 100 points and will consist of questions similar to those seen on the AP Exam. Homework assignments and quizzes will consist of problems from the textbook, supplements, and old AP Exams. Projects are long-term, and typically will involve groups of students developing a plan, engineering a machine, collecting data and/or research, and presenting conclusions in a meaningful way. Laboratory work is student-centered and inquiry-based and will be discussed in more detail below.

Students are expected to be able to communicate clearly and concisely in writing as communication is one of the founding principles of science. All assignments will require students to analyze a problem, state a claim, provide a reason for the claim, and then justify the claim with evidence. Proper grammar and correct spelling are required with some leniency.

A binder or an organizer is required as maintaining a record of what a student has done is also a founding principle of science. Students will be required to keep organized various graded and ungraded work. Binder/organizers will be checked every 9-weeks. Instructor will check for Warm Ups, Quizzes, Lab papers and other graded work.

Grades will be determined by taking the number of points a student has earned and dividing it by the total number of points that the student could have achieved. This decimal is multiplied by 100, and that will be the student's grade.

Topics Covered:

1. Kinematics
    a. Vectors/Scalars
    b. One Dimensional Motion (including graphing position, velocity, and acceleration)
    c. Two Dimensional Motion (Projectiles only)
2. Forces and Translational Dynamics
    a. Newton's Laws of Motion and common Forces
    b. Application of Newton's Laws to Single Body systems
    c. Systems

    d. Application of Newton's Laws to Multibody systems
    e. Apply Newton's Laws of Motion to Motion
3. Work, Energy, and Power
    a. Work and Power
    b. Mechanical Energies
    c. Conservation of Energy
    d. Application of Energy to Dynamics and Kinematics
4. Linear Momentum
    a. Impulse and Momentum
    b. The Law of Conservation of Momentum
    c. Center of Mass
    d. Application of Momentum to Energy, Dynamics, and Kinematics
5. Simple Harmonic Motion
    a. Simple Pendulums
    b. Mass-Spring Oscillators
6. Circular Motion and Universal Law of Gravitation
    a. Two-Dimensional Kinematics
    b. Forces of Two-Dimensional Motion
7. Rotation – Torque, Rotational Dynamics, Energy, and Angular Momentum
    a. Rotational Kinematics
    b. Rotational Energy
    c. Torque and Rotational Dynamics
    d. Angular Momentum
    e. Conservation of Angular Momentum
    f. Energy, Forces, and Momentum of Orbits
8. Fluid Mechanics
    a. Pressure and Pascal's Principle
    b. Buoyancy and Archimedes' Principle
    c. Energy and Bernoulli's Principle

Laboratory Activities:

Twenty-five percent of the course will be lab work. Labs may take several in-class days to finish, and students may have to do work outside of class as well.

Every major unit will have an inquiry-based lab, and inquiry-based labs will make up no less than half of the laboratory work. Collectively, laboratory work will engage students in all seven science practices listed in the ***AP Physics 1 and 2 Course Description***.

Projects:

Students will be required to demonstrate hands-on applications of concepts learned in the classroom by engineering machines with defined goals and limitations.

A. Improving ancient siege machines – Students will build a water balloon launcher that is accurate at 3 different distances and is capable of launching a projectile more than 2 meters in the air.
B. Emergency Ground Gravitational Survival System for Eggs – Students will be given limited materials and time to build machine that can protect an egg dropped from over 10 meters. Students will write a technical paper that is similar to a lab research paper.

C. Rube Goldberg Machine – Students will use their creativity to design a complex machine to perform a simple task. Students will be required to use video editing software to create a professional documentary of their trials and tribulations.