

Physics

UC/CSU "d" approved/NCAA approved

Grade Level: 10-12

Estimated Work Outside of Class: 3 hrs per week

Course Description:

Students engage in exploration of the general concepts of physics. In this challenging course, the main emphasis is on the introductory conceptual aspects of physics in both the lecture and laboratory sections of the class. Critical thinking skills are learned through projects and investigative experience. Strong analytical skills are used to solve conceptual physics problems and projects. Physics is an introductory course in algebra-based high school physics designed to provide students a basic understanding of physics principles in the areas of mechanics, work and energy, electricity and magnetism, semiconductors, waves, optics, and modern physics.

Prerequisite:

Completion of Algebra II with a grade of "C" or higher both semesters

- Recommended: concurrent enrollment in Pre-Calculus

Recommended Prerequisite Skills:

Good ability to solve word problems and apply knowledge of complicated concepts. Good understanding of algebra.

Course Grade Categories:

- Individual work/Project: 10%
- Labs: 30%
- Assessments 60%

Major Assessments/Units/Topics:

For each unit, students learn through in-class lectures and demonstrations. Students apply their knowledge in the labs and hands-on activities. Students also read the textbook to complement the in-class lectures and activities. Each unit typically has Multiple check ins quizzes , 1-2 labs, and a unit assessment which is often a test.

Unit 1: Kinematics: Motion of objects. Students will begin this unit reviewing math concepts required for the year of physics. Students will also learn about speed and acceleration and how to solve real-world problems using kinematic equations. A lab will be done where students graph their motion showing the relationship between speed and acceleration.

Unit 2: Dynamics: In this unit, forces and how they interact with the motion of objects are explored. Students learn about Newton's Laws through reading the textbook, through in class lectures, demonstrations, and discussions, and through student activities and labs. Dynamics is a fun topic which we explore with hands-on activities as time allows. Possible labs in this unit are terminal velocity of a coffee filter or applying Newton's 2nd Law to see how the force of one rolling ball causes acceleration of a second ball.

Unit 3: Momentum and Energy: Students learn about momentum and energy and how they relate to one another. Students perform calculations demonstrating their knowledge of these concepts. This is a shorter unit and, if time permits, there may be an online lab on colliding carts. There are many fun demonstrations on how momentum can be transferred from one object to another.

Semester 1 Final: The semester 1 final is an exam or project which covers all the topics from the first semester up through rotational motion.

Unit 4: Rotational Motion: Students will learn about rotational motion, projectile motion, and about space--the physics of planetary, satellite motion, and tides. Students will have a quiz on rotational motion. For planetary motion, tides, and gravitational fields, students will research one of the topics and present to the class their topic.

Unit 5: Properties of Matter, Heat, and Thermodynamics: Students will review the properties of matter but looking at it from a physics point of view. Students will see how the properties of matter result in a material being conductive or insulating. Students will also learn how the energy of heat can be transformed into energy of motion. Students will explore these concepts in a lab.

Unit 6: Waves: Students will learn about the properties of waves and how waves can carry energy. Students will explore these properties in a lab.

Unit 7: Electricity and Magnetism: Students will learn about static electricity, electric circuits, and magnetism. Students will learn some practical applications with simple circuits and magnets. Students will apply this knowledge in a lab.

Semester 2 Final Project: The semester 2 final project is a Boat Project. The project demonstrates different physics concepts from throughout the school year. Students build the project in groups.