

Syllabus – Integrated Physics and Chemistry

Campus: Calallen High School

Course and/or Grade Level: 9,10,11,12

Course Description: In Integrated Physics and Chemistry, students conduct laboratory and field investigations, use engineering practices, use scientific practices during investigation, and make informed decisions using critical thinking and scientific problem solving. This course integrates the disciplines of physics and chemistry in the following topics: force, motion, energy, and matter.

Semester 1: August 13 – December 19, 2025

1 st Quarter Topics	2 nd Quarter Topics
- Science and Engineering Practices - develop and use models - plan and conduct a variety of investigations - develop scientific explanations and propose solutions supported by data - engage respectfully in scientific argumentation - use appropriate safety equipment and practices - use appropriate data collection tools - organize quantitative and qualitative data - distinguish between scientific hypotheses, theories, and laws - analyze data by identifying significant statistical features, patterns, sources of error - Matter, Elements, and The Periodic Table - model basic atomic structure and relate an bonding, reactivity, and placement on the Periodic Table - predict the relative physical and chemical properties of elements; - explain how physical and chemical properties of substances are related to their usage in everyday life - Quantum Phenomena - explain how electrons can transition from a high energy level to a low energy state, emitting photons - explain how atomic energy levels and emission spectra present evidence for the wave particle duality	- Science and Engineering Practices - develop and use models - plan and conduct a variety of investigations - develop scientific explanations and propose solutions supported by data - engage respectfully in scientific argumentation - use appropriate safety equipment and practices - use appropriate data collection tools - organize quantitative and qualitative data - distinguish between scientific hypotheses, theories, and laws - analyze data by identifying significant statistical features, patterns, sources of error - Chemical Reactions - plan and conduct an investigation to provide evidence that the rate of reaction or dissolving is affected by multiple factors - investigate how changes in properties are indicative of chemical reactions - develop and use models to balance chemical equations - Force and Motion - investigate, analyze, and model motion - analyze data to explain the relationship between mass and acceleration in terms of the net force on an object in one dimension - apply the concepts of momentum and impulse to design, evaluate, and refine a device to minimize the net force on objects during collisions

Semester 2: January 5 – May 29, 2026

3 rd Quarter Topics	4 th Quarter Topics
• Science and Engineering Practices • develop and use models • plan and conduct a variety of investigations • develop scientific explanations and propose solutions supported by data • engage respectfully in scientific argumentation • use appropriate safety equipment and practices • use appropriate data collection tools • organize quantitative and qualitative data • distinguish between scientific hypotheses, theories, and laws • analyze data by identifying significant statistical features, patterns, sources of error • Forces at a distance • describe the nature of the four fundamental forces: gravitation; electromagnetic; the strong and weak nuclear forces • construct and communicate an explanation based on evidence for how changes in mass, charge, and distance affect the strength of gravitational and electrical forces between two objects • Energy • provide evidence that energy is conserved within a closed system • demonstrate and investigate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation • Waves • conduct an investigation to evaluate the transfer of energy or information through different materials • construct and communicate an evidence-based explanation for how wave interference, reflection, and refraction are used in technology	• Science and Engineering Practices • develop and use models • plan and conduct a variety of investigations • develop scientific explanations and propose solutions supported by data • engage respectfully in scientific argumentation • use appropriate safety equipment and practices • use appropriate data collection tools • organize quantitative and qualitative data • distinguish between scientific hypotheses, theories, and laws • analyze data by identifying significant statistical features, patterns, sources of error • Waves • conduct an investigation to evaluate the transfer of energy or information through different materials • construct and communicate an evidence-based explanation for how wave interference, reflection, and refraction are used in technology • Electricity • design and construct series and parallel circuits • design a device that generates electrical energy through the interaction of electric charges and magnetic fields • Energy, Technology and the Environment • analyze, evaluate, and critique scientific explanations and solutions • critique the advantages and disadvantages of renewable and nonrenewable energy sources • research and communicate the uses, advantages, and disadvantages of nuclear reactions • construct and communicate an evidence-based explanation of the environmental impact of the end-products of chemical reactions

**Minor adjustment to the schedule may be made based on campus schedules and student needs.*