ENVISION 21
DEEP LEARNING • CFSD

Science Standard
Catalina Foothills School District
High School: Physics

Physics is an inquiry-based laboratory course that examines the workings of the physical world. Students will examine the workings of the physical world through the study of mechanics, wave phenomena, energy and matter interactions, electricity and magnetism, optics, and relativity. Lab experiments will address the skills of scientific inquiry and data analysis. Modern technology will be used where applicable. Mathematics is used in this course and students should understand basic algebra and graphing. Standard physics is more conceptual and requires less intensive mathematical analysis than Honors Physics. This course fulfills the CFHS third year science credit requirement.

1A. SCIENTIFIC INQUIRY: GENERATING SCIENTIFIC QUESTIONS	
PHY.1a.1	Frames testable questions showing evidence of observations and connections to prior knowledge.
PHY.1a.2	Develops a testable question appropriate to the scientific domain being investigated.
1B. SCIENTIFIC INQUIRY: FORMULATING HYPOTHESES	
PHY.1b.1	Develops a testable hypothesis based upon evidence of scientific principles, probability and/or modeling.
PHY.1b.2	Clearly distinguishes relationships between variables *(required: cause and effect or correlation) within a testable hypothesis)*.
1C. SCIENTIFIC INQUIRY: DESIGNING INVESTIGATIONS	
PHY.1c.1	Specifies the parameters of measurement.
PHY.1c.2	Describes suitable controls for the investigation.
PHY.1c.3	Designs procedures that appropriately address the hypothesis.
1D. SCIENTIFIC INQUIRY: DATA COLLECTION	
PHY.1d.1	Creates and demonstrates safe and ethical procedures.
PHY.1d.2	Uses units of measurement with appropriate degree of accuracy.
PHY.1d.3	Creates procedures that appropriately and adequately address the hypothesis *(for example: adequate sample size, multiple trials)*.
PHY.1d.4	Creates a suitable method of recording data.
1E. SCIENTIFIC INQUIRY: ANALYSIS	
PHY.1e.1	Interprets data to describe relationships between variables *(for example: positive, negative, no relationship)*.
PHY.1e.2	Incorporates mathematical analysis, where appropriate.
PHY.1e.3	Critiques the investigation for possible sources of error and suggests corrections.
1F. CONCLUSIONS AND EXTENSIONS	
PHY.1f.1	Makes evidence-based predictions *(for example: extrapolations and interpolations)*.
PHY.1f.2	Evaluates whether the data support the hypothesis.
1G. COMMUNICATION	
PHY.1g.1	Uses suitable media to inform an audience about an investigation.
PHY.1g.2	Applies appropriate ethics *(for example: language, style, citations)*.
2. INTERACTION OF SCIENCE AND SOCIETY	
PHY.2.1	Describes the interaction of science, human curiosity and societal needs *(for example: development of steam power and the Industrial Revolution; nuclear energy)*.
PHY.2.2	Critically analyzes the science concepts behind societal issues *(for example: nuclear energy; space exploration; alternative fuels)*.

3A. SYSTEMS THINKING: CHANGE OVER TIME	
PHY.3a.1	Explains how a system's components change over time *(for example: development of an atmosphere, work-energy theorem, momentum in collisions)*.
3B. SYSTEMS THINKING: INTERDEPENDENCIES	
PHY.3b.1	Explains the causal relationships in a system as being either positive or negative feedback relationships *(for example: global warming, gravity/radiation in stars, static equilibrium, current in RC circuits)*.
3C. SYSTEMS THINKING: SYSTEM-AS-CAUSE	
PHY.3c.1	Explains reasons why specific behaviors result from the organization of a system *(for example: dynamic rock cycle, simple machines, Atwood's machine, potential energy)*.
4. MOTION AND FORCES	
PHY.4.1	Analyzes relationships between forces and motion.
PHY.4.2	Determines the rate of change of a quantity *(for example: rate of erosion, rate of reaction, rate of growth, velocity)*.
PHY.4.3	Analyzes the relationships among position, velocity, acceleration, and time.
PHY.4.4	Explains how Newton's Laws apply to various situations.
5. MOMENTUM	
PHY.5.1	Analyzes collisions in terms of conservation of momentum.
PHY.5.2	Describes impulse as rate of change of momentum.
6. INTERACTIONS OF ENERGY AND MATTER	
PHY.6.1	Describes various ways in which matter and energy interact.
PHY.6.2	Describes various ways in which energy is transferred from one system to another *(required: various ways in which waves interact with each other and with other materials)*.
PHY.6.3	Describes the characteristics of waves *(required: wavelength, frequency, period, amplitude)*.
PHY.6.4	Explains the relationship between the wavelength of light absorbed or released by an atom or molecule and the transfer of a discrete amount of energy.
7. ENERGY IN SYSTEMS OF PARTICLES	
PHY.7.1	Describes the flow of energy to and from different systems *(for example: calorimetry; Earth systems (atmosphere, hydrosphere, lithosphere); electronic systems)*.
PHY.7.2	Analyzes energy interactions in terms of changes in potential and kinetic energy.
PHY.7.3	Describes various ways that energy is transformed, but is conserved.
PHY.7.4	Explains the mechanisms of heat transfer *(required: convection, conduction, radiation)*.
8. ELECTRICITY AND MAGNETISM	
PHY.8.1	Describes Ohm's Law and uses it to analyze simple circuits.
PHY.8.2	Demonstrates how electric and magnetic fields interact.