FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

Physics in the Universe

Board Approval Date: April 15, 2021	**Course Length: 2 Semesters**
Grading: A-F	**Credits: 5 Credits per Semester**
Proposed Grade Level(s): 10, 11	**Subject Area: Physical Science** **Elective Area (if applicable):**
Prerequisite(s): **N/A**	**Corequisite(s):** **Integrated Math 1**
CTE Sector/Pathway:	
Intent to Pursue 'A-G' College Prep Status: Yes	
A-G Course Identifier: (d) Laboratory Science	
Graduation Requirement: Yes	
Course Intent: District Course **Program (if applicable):**	
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COURSE DESCRIPTION: (Online Course)

Physics of the Universe is a course in the California Next Generation Science Standards (CA NGSS) Three Course Model and includes the Disciplinary Core Ideas related to Physical Science and integrates a selection of the Earth and Space Science concepts. This course also incorporates the eight Science and Engineering Practices and seven Crosscutting Concepts related to the NGSS. In this course students will explore the following core ideas: forces and motion, energy transfers and conservation, the properties of waves, and the electromagnetic spectrum, and use these ideas to understand the processes that shape earth and space systems. Engineering Core Ideas are used to explore applications of Physics concepts. This course is taught using an online platform.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Intro to Physics in the Universe	How do you utilize mathematics to support investigating physics? How do you use graphs to understand physics?	*Math in Physics graphing	*Unit Test
2. Energy in the Universe	What is work and how is it measured? What is energy? What is meant by conservation of energy? How is energy transferred between objects or systems? How are forces related to energy? What are the different types of energy and how does energy change form between them?	*Practice: Energy and Heat	*Lab: Conservation of Energy *Unit Test
3. Electricity and Magnetism	How are electricity and magnetism related? How do you use equations to predict the gravitational and electrostatic forces between objects? How can you get electricity to a source from a receiver? What does a switch do in a circuit? Why does it matter if Earth has a magnetic field? How are magnetic fields both helpful and harmful? To what extent can you predict interactions in magnetic fields? Why does there exist a relationship between electrical currents and magnetic fields?	*Parallel and Combined Circuits: diagram parallel and combined circuits; learn how to determine the current; resistance; or voltage in a parallel circuit.	*Lab: Circuit Building *Project: Interactions of Electric and Magnetic Fields *Unit Test

4. Energy Consumption and Resources	What are sources of renewable energy? What are sources of nonrenewable energy? What are sources of energy used for? What are the costs and benefits of humanity's demand for, and consumption of, energy from a variety of sources? How can we minimize impacts to earth's resources?	*Alternative Energy Resources: Written response on how the use of natural resources will affect future generations of humans and how to minimize impacts.	*Project: Design an Energy-Conversion Device *Project: Investigate Passive Heating and Cooling *Unit Test
5. Dynamics	How can we use forces and the laws of motion to understand the motion of objects? How can you find the speed and velocity of an object? What is the relationship between force, mass, and acceleration?	*Free-Body Diagrams: Learn how to solve problems using Newton's second law and how to do calculations involving force and work	*Lab: Newton's Laws *Unit Test
6. Momentum and Gravitation	How is momentum conserved? What factors determine the friction force between two surfaces? How can you relate the significance of the variables m1, m2, G, Fg, x in the Newton's Universal Law of Gravitation? What happens when unbalanced forces meet?	*Practice: Two-Dimensional Collisions *Practice: Gravitation	*Project: Minimizing the Force of Collisions *Unit Test
7. Waves	What is a wave? What types of energy travel in waves? What types of energy do not travel in waves? How do waves travel through various media? What is the difference between wave model and	*Project: Effects of Electromagnetic Radiation on Matte	*Lab: Wave Motion *Unit Test

	particle model?		
8. Cosmology	How does the theory of the solar system's origin explain its observed properties? What is the difference between fission and fusion? How does astronomy answer the question: "What are we made of, and where do we come from?" How does the theory of the solar system's origin explain its observed properties? How do we know the universe is expanding? What is the life cycle of a star?	*Practice: Origins of the Universe *Practice: Stars	*Lab: Nuclear Physics *Unit Test
9. Geophysics	How does the Earth change? How do you describe the rock cycle? What happens when 2 or more thermal energies combine? How old is the Earth? How has Alfred Wegener's theory of continental drift and scientists' knowledge of sea- floor spreading helped us learn more about plate tectonics? How do weathering and erosion affect the earth's surface features and materials?	*: Investigate Weathering and Erosion	*Project: Modeling Geologic Processes *Unit Test

APEX Units 6&11: Review and Exams

ESSENTIAL STANDARDS:

PS2-1: Analyze data to support the claim that Newton's 2nd Law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

PS2-2: Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).

PS2-4: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

PS2-5: Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

ESS2-1: Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

ESS1-1: Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation.

ESS1-2: Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):
Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.
9th-10th http://www.corestandards.org/ELA-Literacy/RST/9-10/
11th-12th http://www.corestandards.org/ELA-Literacy/RST/11-12/

Link to Framework (if applicable):
Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.
https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter7.pdf

Link to Subject Area Content Standards (if applicable):
Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.
https://www.nextgenscience.org/

Link to Program Content Area Standards (if applicable):
Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
Yes		*APEX: Physics in the Universe*		APEX Online Courses		*2020*

Other Resource Materials

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, Programs (Pebble Creek, DBQ, etc.):