11/9/2016

El Monte Union High School District

Course Outline

High School District

Created by El Monte High School

Title: Conceptual Physical Science 1P

Transitional*_____(Eng. Dept. Only)

Sheltered (SDAIE)*____Bilingual*___

AP**_____Honors**_____

Department: Science

Grade Level (s): 9th

Semester_____Year X

Year of State Framework Adoption 1998
Year of Next Generation Standards 2013
(Common Core)

This course meets graduation requirements:

( ) English
( ) Fine Arts
( ) Foreign Language
( ) Health & Safety
( ) Math
( ) Physical Education
(X) Science
( ) Social Science
( ) Elective

Department/Cluster Approval	Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

*Instructional materials appropriate for English Language Learners are required.

**For AP/Honors course attach a page describing how this course is above and beyond a regular course. Also, explain why this course is the equivalent of a college level class.

1. Prerequisite(s): Algebra 1 or Integrated Math 1

2. Short description of course which may also be used in the registration manual:

This one-year introductory Conceptual Physical Science course offers a more conceptual approach to the study of physical science covering physics, earth and chemistry standards outlined in the California Science Content Standards as well as the physics, earth and chemistry standards included in the Next Generation Science Standards. Science equation calculations will be taught with more guidance for the students, but the main focus will be on how the variables interact with each other in the equation. For example, v=d/t problems will be calculated, but the focus will be on the relationships between v, d, and t. Such as, if the velocity increases, either the distance traveled must increase or the time traveled must decrease. Labs will be emphasized to help develop critical thinking and problems solving skills. Students wishing to apply to UC/CSU must achieve a minimum grade of "C" in this course to meet P elective credit.

3. Describe how this course integrates the schools ESLRs (Expected School-wide Learning Results):

The following ESLR's will be integrated:

Academic Skills: Students will seek, access, analyze and creatively use information to demonstrate effective communication, computation, critical thinking and technological skills by solving problems for assignments, labs and other assessments aligned to the California Content Standards, the Common Core Next Generation Standards, and the District Course Standards.

Interpersonal Skills: Students will be productive community members by learning to respect diversity, exercise rights, accept responsibility and work cooperatively with others while doing work for the class and while working cooperatively in labs.

Personal Skills: Students will make informed decisions, set goals, take actions and evaluate results while exhibiting honesty, integrity and personal accountability as they complete work for the course.

Career Skills: Students will explore a variety of career options and develop personal attributes and skills that lead to the pursuit of a post-secondary education and/or a productive work life as they complete work for the course, perform labs and do research on computers.

4. Describe the additional efforts/teaching techniques/methodology to be used to meet the needs of English Language Learners:

   a) SIOP (Sheltered Instruction Observation Protocol) strategies will be incorporated into lessons.
   b) SDAIE (Specially Designed Academic Instruction in English) strategies will be incorporated into lessons.
   c) ELL supplementary materials will be incorporated into the lessons.
   d) Glossaries will be used as available.
   e) Visuals/Manipulatives will be used.

5. Describe the interdepartmental articulation process for this course:

When applicable, the science department is willing to work with other departments to coordinate student work on course projects. All students take a Tech Core class for an introduction to computer applications. The individual departments then build computer skills through assigning various projects requiring Word Processing, Spreadsheet and Graphing. The Media Center provides class instruction on computer applications and research when needed. The students will be using English skills and Math/Computational skills as they complete work for the class, which will reinforce instruction in those departments and vice versa.

6. Describe how this course will integrate academic and vocational concepts, possibly through connecting activities. Describe how this course will address work-based learning/school to career concepts:

Students will be exploring career pathways and employment requirements within the Physical Sciences, when opportunities arise in the curriculum, as the students proceed through lessons in the branches of the different physical sciences: physics, earth science and chemistry.

7. Materials of Instruction (Note: Materials of instruction for English Language Learners are required and should be listed below.)

   A. Textbook(s) and Core Reading(s):
      Holt Science Spectrum with Earth and Space Science, Holt, Rinehart, & Winston 2008

   B. Supplemental Materials and Resources:

   C. Tools, Equipment, Technology, Manipulatives, Audio-Visual:

Visual presentations will be made using overhead transparencies, videos, models and/or presentations with a LCD projector. A variety of standard glassware, physics equipment and laboratory equipment including balances, hotplates, and chemicals, etc. will be used during the laboratories. Standard computer technologies including MS Office, web browsers and 3rd party software will be used as necessary.

8.

- **Objectives of Course**
- **Unit detail including projects and activities including duration of units (pacing plan)**
- **Indicate references to state framework(s)/standards (If state standard is not applicable then national standard should be used)**
- **Student performance standards**
- **Evaluation/assessment/rubrics**
- **Include minimal attainment for student to pass course**

Course Objectives:

1) Students will learn fundamental concepts in the Physical Sciences, including Physics, Chemistry and Earth Science, as prescribed by the California Science Content Standards and the Science & Engineering Common Core Next Generation Standards.
2) Students will learn introductory laboratory skills and measurement skills necessary to be successful in subsequent science courses, including Biology, Chemistry and Physics.
3) Students will learn computational skills and how to apply basic concepts of algebra to solve simple equations, but the main emphasis will be on learning how the variables interact with each other in the equations
4) Students will learn how to organize and present data, including how to construct, read and interpret bar, line and circle graphs.
5) At the end of this course motivated students will have a good understanding of the fundamentals of science to enable them to be successful in more advanced science courses.

Laboratory Investigation and Experimentation:

All students are expected to have an understanding of common laboratory safety procedures as demonstrated by their use during practical laboratory activities. **Practical laboratory activities must consist of a minimum of 20% of the regular instructional time.** (Ex. 2-3 days of a traditional schedule per 2-3 week period.)

The following are some suggested labs, to be supplemented, by additional labs preferred by the instructor.

Unit	Labs/Projects
Investigative Skills	Soda Can Activity - Students use inquiry skills, apply scientific method, hypothesize conclusions, and communicate results by determining which soda will float, diet or regular soda.
	Density Lab - Students determine the sugar content in bubble gum using scientific instruments to determine the density of the bubble gum before and after chewing.
Forces and Interactions	Car Project - Students design and create a car using manila folders, index cards, rubber bands, straws, paper clips, and tape. The cars must move forward on its own power.
	Car Lab - Students analyze the car built by determining speed, velocity, acceleration, weight, force, work, and power.
Work/Power/Energy	Kinetic Energy/Potential Energy Lab - Students calculate and compare the kinetic and potential energies of a toy car moving down a ramp. The students must evaluate their results in regard to the Law of Conservation of Energy.
Temperature	Can Lab - Students analyze the affects of color on reflection and absorption of solar radiation using tin cans filled with water.
Waves and Electromagnetic Radiation	Waves Lab - Students use slinkys to compare longitudinal and transverse waves, to calculate frequency, amplitude, and wave speed, and to observe results when variables are changed.
Electricity	Light it Up - Students design simple circuits with wires, a battery, and a light bulb and predict which everyday materials will be good conductors.
	Parallel/Series Circuit Lab - Students build parallel and series circuits and modify their circuits to determine what happens when altered.

	Electricity Project - Students design and create a house that has parallel and series circuits and handmade switches using lights, wires, and one battery.
Earth's Place in the Universe	Solar System Scavenger Hunt - Students search the internet for "clues" about our solar system. This activity emphasizes research skills, refining searches, determining credible websites, and communicating results.
History of Earth/Earth's Systems	Continental Drift Lab - Students predict the movement of the continents and the land formations at the plate boundaries.
	Rock Cycle Lab - Students study and diagram the rock cycle and then re-enact the path of rocks in the rock cycle throughout the classroom and analyze their journey.
	Measuring Earthquakes Lab - Students are provided seismograms and determine the epicenter of an earthquake and its magnitude.
Atmospheric Interactions	Atmosphere: Just Right - After studying about the layers and gases of the atmosphere, students hypothesize about different scenarios concerning the atmosphere and its composition.
Weather	Heating of Land and Water Lab - Using sand and water, students record and evaluate the temperatures of both and relate their data to the heating and cooling of land masses and oceans and relate their findings to weather/climate.
	Weather Log - Students record high and low temperatures, barometric pressure, wind speed, cloud cover, and precipitation. From their data students formulate trends observed and predict future forecasts.
Oceanography	Convection Current Lab - Students create convection currents and explain how this relates to ocean currents.
	Mapping the Ocean Floor Lab - Students graph coordinates and map the ocean floor.
Human Impact	Environmental Current Issue Project (i.e. Global Warming, Acid Rain, etc.)

Structure and Properties of Matter	Law of Conservation of Matter Lab Part I - Students compare the mass of a Zip lock bag of water and an Alka-Seltzer separately and then compare the mass after the Alka-Seltzer has been sealed in the bag of water and reacted. Part II - Students compare the mass of an ice cube in a Zip lock bag before it has melted and after it has melted.
Matter and its Interactions	Special Properties of Metals Lab - Students calculate and compare properties of density, hardness, heat conductivity and magnetic properties of various metals.
Chemical Reactions	Metal Transfer Lab - Students perform a single displacement (redox) reaction of a nail and penny in vinegar.

Student Performance Standards for Physical Science 1P

Investigative Skills: (The students will be able to …)
Science Standards: I&E 1a,b,c,d,e,f,g,i,j,k,l,m,n
CCSS: none

a) select/identify appropriate tools to perform investigations and experiments while applying the scientific method and practicing laboratory safety.
b) measure mass, volume, length/distances and use basic.
c) perform experiments to collect data, interpret results, organize and display data into tables, charts, graphs and lab reports.
d) use appropriate tools and such as: balances, stop watches, thermometers, meter sticks, etc. to collect data and perform basic calculations.
e) apply and use the SI units during an investigation and apply the knowledge across the Physical Science curriculum. Identify the SI units for length, mass and time.
f) describe and discuss the utilization of models and basic mathematics to illustrate scientific theories, laws, and phenomenon.

Forces and Interactions: (The students will be able to …)
Science Standards: Physics 1a,b,c,d,e,2d,e,f
CCSS: HS-PS2-1,2

a) use a reference point to discriminate distance and time and evaluate the speed of an object.
b) define and distinguish and calculate speed and velocity, but mainly focus on how the variables interact with each other. For example, if the velocity increases, either the distance traveled must increase or the time traveled must decrease.
c) understand, analyze, and evaluate problems involving time, distance, speed and velocity.

d) describe, calculate and discuss the terms momentum, acceleration, net force, unbalanced and balanced forces in a given diagram, but mainly focus on how the variables interact with each other.
e) recognize and explain that gravity and friction are types of forces.
f) recognize and explain Newton's three laws of motion. Calculate the force of an object using Newton's second law (F=ma). Focus on how the variables interact with each other.

Work/Power/Energy: (The students will be able to …)
Science Standards: Physics 2a,b,c,e
CCSS: HS-PS3-1,2

a) understand and calculate work and power. Focus on how the variables interact with each other.
b) understand, describe, evaluate, calculate and state examples for potential and kinetic energy. Focus on how the variables interact with each other.
c) describe and distinguish various forms of energy such as chemical, nuclear, electrical, light energies.
d) understand and explain the Law of Conservation of Energy.

Temperature: (The students will be able to …)
Science Standards: Physics 3abc, Chemistry 4e,f,g,7a,d
CCSS: HS-PS3-2,4, HS-PS-1-3

a) understand temperature in terms of average kinetic energy of atoms and molecules.
b) convert temperature readings between ^{o}F, ^{o}C and Kelvin.
c) describe heat as a method of energy transfer in matter.
d) demonstrate how energy is transferred by conduction, convection, and radiation.
e) understand specific heats.
f) understand and explain the Laws of Thermodynamics (Heating and Cooling Systems).

Waves and Electromagnetic Radiation: (The students will be able to …)
Science Standards: Physics 4a,b,c,d,e,f
CCSS: HS-PS4-1,3,5

a) compare and contrast between longitudinal and transverse waves.
b) describe and diagram the parts of a wave.
c) understand and calculate the speed, period, and frequency of waves. Focus on how the variables interact with each other.
d) describe how the frequency of waves change using the Doppler Effect.
e) describe how waves propagate through different mediums.
f) understand and describe wave interference.
g) understand the electromagnetic spectrum.

Electricity: (The students will be able to …)
Science Standards: Physics 5a,b,c,e
CCSS: HS-PS2-5,6, HS-PS3-1,2,5

a) understand and describe the properties of electricity: current, resistance, potential difference.
b) understand and calculate the different parts of Ohm's Law. Focus on how the variables interact with each other.
c) understand and calculate power. Focus on how the variables interact with each other.
d) describe and understand the difference between conductors and insulators.
e) explain and calculate the differences between circuits in series and parallel. Focus on how the variables interact with each other.
f) understand and explain schematic diagrams.

Earth's Place in the Universe: (The students will be able to …)
Science Standards: Earth Science 1a,b,c,d,e,2a,b,d,f,g
CCSS: HS-PS1-8, HS-ESS1-1,2,3,6

a) describe the origin (big bang theory) of the universe and its future.
b) describe the structure of the Milky Way Galaxy and list the three types of galaxies.
c) describe the properties and life cycles of stars. Describe the structure and location of our sun.
d) describe the structure and birth (nebular theory) of the solar system. Differentiate terrestrial (inner) and Jovian (outer) planets.
e) describe other types of heavenly bodies.
f) describe the phases of the moon.

History of Earth/Earth's Systems: (The students will be able to …)
Science Standards: Physics 4a,b, Earth Science 3a,b,c,d,e,f
CCSS: HS-ESS1-5, HS-ESS2-1,3

a) identify Earth's different geological layers.
b) understand the Earth in terms of the unifying theory of plate tectonics. Know the three plate boundaries and the significance of their geological features.
c) describe the effects and formation of earthquakes. Define and explain how earthquake waves provide information about the Earth's interior. Identify earthquake prone areas in California.
d) explain the formation and classification of the three types of volcanoes (including hotspots). Identify volcanoes in California.
e) identify the three rock families and explain the geological processes that form them. (Describe the Rock Cycle.)
f) describe weathering and erosion.

Atmospheric Interactions: (The students will be able to …)
Science Standards: Earth Science 1c,4a,b,c,8a,b,c
CCSS: HS-ESS2-2,6, HS-ESS3-1

a) recognize the structure and temperature of the atmosphere. Explain the importance of the ozone layer and its location. Describe the greenhouse effect and the effect it has on Earth.
b) know the fate of incoming solar radiation in terms of reflection, absorption, and photosynthesis.
c) describe how the atmosphere has evolved over time.
d) know the global carbon cycle.

e) recognize the human impact on climate and weather such as the ozone hole and global warming.

Weather: (The students will be able to …)
Science Standards: Earth Science 5a,b,c
CCSS: HS-ESS2-5

a) understand air pressure and its relationship to winds.
b) demonstrate basic knowledge and understanding of wind patterns and air mass and how water moves in the atmosphere in a cyclic pattern. Describe and identify cloud types. Identify different storm types and how air mass is involved in the formation of a storm.
c) explain the water cycle.

Climate: (The students will be able to …)
Science Standards: Earth Science 6a,b,c,5e
CCSS: HS-ESS2-4

a) identify factors that affect climate, such as topography, latitude, altitude, and air masses.
b) explain global wind patterns.

Oceanography: (The students will be able to …)
Science Standards: Earth Science 5d
CCSS: none

a) recognize the geological features of the ocean floor.
b) recognize major oceanic circulation patterns.
c) understand the unequal heating of the Earth's surface drives global circulation patterns.
d) understand the rotation of the Earth effects global currents.

Human Impacts: (The students will be able to …)
Science Standards: none
CCSS: HS-ETS1-1,2,3,4

a) complete an Environmental Current Issue Project (i.e. global warming, ozone hole etc.)

Structure and Properties of Matter: (The students will be able to …)
Science Standards: Physics 3c,5i, Chemistry 2d,4a,b,7c
CCSS: HS-PS1-2

a) know the four states of matter and understand the Law of Conservation of Matter.
b) understand the Kinetic Theory.
c) understand and explain the differences between chemical/physical properties and changes.

Matter and its Interactions: (The students will be able to …)
Science Standards: Chemistry 1a,b,c,d,e,3b,c,d,11c
CCSS: HS-PS1-1,3,7

a) explain the differences between the different Atomic Theories (Democritus, Dalton, Bohr and Modern Model)
b) know how to use the periodic table such as: locating the atomic number, mass number, element, etc.
c) identify the families on the periodic table.
d) calculate basic conversions using grams, moles and molar mass.

Chemical Compounds: (The students will be able to …)
Science Standards: Chemistry 2a,b,c,10a,b,c
CCSS: HS-PS1-2, LS1-6

a) understand models of compounds and chemical formulas.
b) understand the structure of organic compounds, polymers, and biological macromolecules.
c) identify the different types of bonds.
d) know common ions.
e) write chemical names for chemical formulas and write chemical formulas from their chemical names.

Chemical Reactions: (The students will be able to …)
Science Standards: Chemistry 3a
CCSS: HS-PS1-2,6

a) describe the types of chemical reactions.
b) balance simple chemical reactions.

Evaluation/ Assessment/ Rubrics including Attainment for Student to Pass Physical Science

"A"-level work (90-100%): (Excellence overall; no major weaknesses).
This student demonstrates real achievement in grasping scientific thinking, along with development of specific physical science thinking skills and abilities. This student's work is clear, precise, and well reasoned.

"B"-level work (80-89%): (Moderate level of understanding and skill in scientific thinking with some distinctive weaknesses, showing more strengths than weaknesses).
This student demonstrates a good level of achieving scientific thinking with occasional areas of weakness. This student's work is essentially clear and precise with occasional lapses into weak reasoning.

"C"-level work (70-79%): (More than a minimum level of understanding and skill in scientific thinking, but highly inconsistent with as many weaknesses as strengths.)
This student demonstrates a mediocre level of achieving scientific thought with pronounced areas of weakness. This student's work is inconsistent, showing only modest skills and reasoning.

"D"-level work (60-69%): (Minimal level of understanding and skill in scientific thinking).

This student demonstrates a lack of clarity and discipline. This student's work does not show good scientific reasoning and skills, only rarely showing any attempt to take charge of ideas.

"F"=level work (<59%): (Far below minimal level of understanding and skill in scientific thinking).
This student does not display any discernible scientific reasoning. This student failed to do the required work of the course.

Conceptual Physical Science 1P Pacing Plan

CCSS	Science Std.	Objectives
		FALL SEMESTER First Grading Period
	IE 1a,b,c,d,e,f,g ,i,j,k,l,m,n	**Investigative Skills** Scientific Method Organizing Data/Graphing Tools Metric System Scientific Calculations - Conversions, Significant figures, Scientific notation
HS-PS2-1,2	Physics 1a,b,c,d,e,2d, e,f	**Forces and Interactions** Speed, Velocity, Acceleration Momentum Forces - balanced and unbalanced forces, friction, air resistance, gravitational force, weight, freefall, terminal velocity Newton's Laws of Motion
		FALL SEMESTER Second Grading Period
HS-PS3-1,2	Physics 2a, b,c,e	**Work/Power/Energy** Power Energy - Potential and Kinetic energies, Other forms of energy (chemical, nuclear, electrical, light energies), Law of Conservation of Energy
HS-PS3-2,4 HS-PS1-3	Physics 3a,b,c Chemistry 4e,f,g,7a,d	**Temperature** Energy transfer - conduction, convection, radiation Specific heat Heating and Cooling systems - Laws of Thermodynamics

Conceptual Physical Science 1P Pacing Plan

CCSS	Science Std.	Objectives
HS-PS4-1,3,5	Physics 4a,b,c,d,e,f	**Waves and Electromagnetic Radiation** Types of waves Characteristics of waves Calculations for waves - speed, period, frequency Doppler Effect Wave Interference Electromagnetic spectrum
		FALL SEMESTER Third Grading Period
HS-PS2-5,6 HS-PS3-1,2,5	Physics 5a,b,c,e	**Electricity** Properties of electricity - current, resistance, potential difference, Ohms Law, power Conductors and insulators Circuits - series and parallel Schematic diagrams
HS-PS1-8 HS-ESS1-1,2,3,6	Earth Science 1a,b,c,d,e,2a,b,d,f,g	**Earth's Place in the Universe** Big Bang Theory - evidence Types of galaxies Life Cycle of Stars Formation of the solar system Other heavenly bodies Phases of the moon

Conceptual Physical Science 1P Pacing Plan

CCSS	Science Std.	Objectives
		SPRING SEMESTER First Grading Period
HS-ESS1-5 HS-ESS2-1,3	Physic 4a,b Earth Science 3a,b,c,d,e,f	**History of Earth/Earth's Systems**
		Plate techtonics - volcanoes, earthquakes, plate movement and formations
		Earth's interior
		Rock Cycle
		Weathering and Erosion
HS-ESS2-2,6 HS-ES3-1	Earth Science 1c,4a,b,c,8a, b,c	**Atmospheric Interactions**
		Atmosphere - composition, layers
		Heat transfer
		Carbon Cycle
		Greenhouse Effect and Global Warming
		SPRING SEMESTER Second Grading Period
HS-ESS2-5	Earth Science 5a,b,c,	**Weather**
		Air pressure
		Wind - generation and patterns
		Temperature Inversion
		Clouds
		Precipitation
		Water Cycle
HS-ESS2-4	Earth Science 6a,b,c 5e	**Climate**
		Effectors of Climate - topography, latitude, altitude, air masses
		Global wind patterns

Conceptual Physical Science 1P Pacing Plan

CCSS	Science Std.	Objectives
	Earth Science 5d	**Oceanography**
		Ocean structure (seawater)
		Ocean circulation
HS-ETS1-1,2,3,4		**Human Impacts**
HS-PS1-2	Physics 3c,5i Chemistry 2d,4a,b,7c	**Structure and Properties of Matter**
		States of Matter - Laws of Conservation
		Kinetic Theory
		Chemical/physical properties and changes
		SPRING SEMESTER Third Grading Period
HS-PS1-1,3,7	Chemistry 1a,b,c,d,e,3b, 3c,3d,11c	**Matter and its Interactions**
		Atomic theories (Democritus, Dalton, Bohr, Modern models)
		Periodic Table
		Families of Elements
		Moles and Molar Mass
HS-PS1-2 HS-LS1-6	Chemistry 2a,b,c,10a,b, c	**Chemical Compounds**
		Models of Compounds
		Chemical formulas
		Organic Compounds
		Polymers
		Biological macromolecules
		Chemical names
		Common ions
		Naming chemicals
HS-PS1-2,6	Chemistry 3a	**Chemical Reactions**