PHYS C140: SURVEY OF CHEMISTRY AND PHYSICS

Item	Value
Curriculum Committee Approval Date	12/04/2015
Top Code	190200 - Physics, General
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• CL Option 1 Natural Sciences (CB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1) • CSU B3 Laboratory Activity (B3)

Course Description

An investigation of basic principles of physics and chemistry including matter, physical and chemical properties, energy, motion, light, atomic structure, bonding, solutions and chemical reactions. The inter-dependence of chemistry and physics will be emphasized. This course is intended for non-science majors. Enrollment Limitation: CHEM C140; students who complete PHYS C140 may not enroll in or receive credit for CHEM C140. ADVISORY: A course taught at the level of beginning algebra or appropriate math placement. Transfer Credit: CSU; UC: Credit Limitation: CHEM C110, CHEM C130, CHEM C140 and PHYS C140 combined: maximum credit, 1 course; No credit for PHYS C110, PHYS C110L or PHYS C140, CHEM C140 if taken after PHYS C120 or PHYS C185; PHYS C110, PHYS C110L and PHYS C140, CHEM C140 combined: maximum credit, 4 units; No credit for CHEM C140, PHYS C140 if taken after CHEM C180 or CHEM C220. C-ID: PHYS 140.**C-ID:** PHYS 140.

Course Level Student Learning Outcome(s)

1. Correctly analyze natural phenomena using the concepts of physics and chemistry.
2. Identify and explain the most important discoveries in the fields of physics and chemistry.
3. Demonstrate understanding of basic concepts dealing with chemical reactions.
4. Investigate physical phenomena using appropriate equipment and methods, make valid comparisons with theoretical predictions, and communicate those results.

Course Objectives

- I Lecture Objectives
- I. 1. Describe the states of matter and associated phase changes
- I. 2. Describe basic atomic structure including the fundamental particles and electron energy levels
- I. 3. Explain the history and structure of the periodic table.
- I. 4. Describe the motion of objects as related through the concepts of position, displacement, speed, velocity, and acceleration.
- I. 5. Use Newtons Laws to predict and explain the motion of an object.
- I. 6. Discuss the type of energy present in a system and use conservation of energy to solve problems.
- II Lab Objectives
- II. 1. Demonstrate fundamentals of taking and recording measurements, including measuring length, area, volume, mass, density, significant figures, converting between units and scientific notation.
- II. 2. Apply practical applications to both the chemistry and physics lecture objectives.
- II. 3. Draw conclusions between data and results including constructing graphs and identifying relationships between variables.

Lecture Content

Measurement Fundamental Properties Fundamentals of measuring length, area, volume and mass Density of materials The Scientific Method Structure of Matter Atomic theory and basic atomic structure including the relationships between sub-atomic particles Periodic Table of Elements and periodic trends to atomic structure Characteristics of the atomic, ionic, and molecular classes of matter Phases of matter (solids, liquids, and gases) and the connections between the properties using a particle model Classification of matter-elements, substances, compounds, mixtures Basic characteristics of solutions, including acids and bases, and their relationship to the pH scale Matter and its Changes Phases of matter and associated phase changes Chemical and physical changes and classifying chemical and physical properties of matter Basic principles of chemical bonding and chemical reactivity Energy changes during chemical reactions Motion, Forces and Energy Motion of objects as related through the concepts of position, displacement, speed, velocity, and acceleration Interpretation of distance vs. time and speed vs. time graphs The relationship between a net force and the motion of an object Explain how action and reaction forces are related to each other Basic forces in the universe including electrostatic, gravitational and magnetic Forms of energy including solar, chemical, magnetic, electric, nuclear, and thermal The relationship between net force, work, and kinetic energy Conservation of energy and how energy is transformed from one form to another The nature of heat (thermal energy) and heat transfer (conductive, convective, radiant) and their relationship to temperature and temperature measurement Electricity and Magnetism Electric charge and how charge is transferred from one object to another Models of electric current, voltage, resistance and their interrelationships The construction and operation of simple electrical circuits and the difference between series and parallel combinations of resistors Waves and Light Longitudinal and transverse waves Properties of sound Doppler effect and Interference Electromagnetic radiation (light), the electromagnetic spectrum and sources of light Relationship between wavelength (or frequency) and color Color perception Reflection and refraction of waves

Lab Content

Computers Internet research Graphical representation of experimental data Simulation of laboratory experiments Measurement Precision and accuracy Significant digits and scientific notation Physical, chemical and geological experiments Use of laboratory equipment Interpretation of results

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

Lecture, laboratory, computer-based assignments, written assignments, and reading.

Reading Assignments

The students shall, each week, read the following: Selections from the textbook The introduction to each laboratory exercise Handouts given in class

Writing Assignments

The student, during the course of the semester, shall: Compose lab reports based on the associated laboratory experiments. Write brief answers to questions in the lab exercises Write answers to questions at the end of chapters from the text.

Out-of-class Assignments

The student, during the course of the semester, shall: Search for news articles that discuss current discoveries and/or explorations in physics and chemistry. Search for online videos and/or simulations related to physics and chemistry.

Demonstration of Critical Thinking

The students shall, during the semester, undertake the following: Analyze physical phenomena related to physics and chemistry, make predictions based on that analysis, and test those predictions in laboratory experiments.

Required Writing, Problem Solving, Skills Demonstration

The students shall, during the semester, undertake the following: Write brief answers to test/quiz questions. Solve homework problems related to physics and chemistry. Prepare lab reports based on laboratory activities.

Eligible Disciplines

Chemistry: Masters degree in chemistry OR bachelors degree in chemistry or biochemistry AND masters degree in biochemistry, chemical engineering, chemical physics, physics, molecular biology, or geochemistry OR the equivalent. Masters degree required. Physical sciences: See interdisciplinary studies Masters degree required. Physics/Astronomy: Masters degree in physics, astronomy, or astrophysics OR bachelors degree in physics or astronomy AND masters degree in engineering, mathematics, meteorology, or geophysics OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Hewitt, P.; Suchocki, J.; Hewitt, L. The Physics of Everyday Phenomena, 10th ed. McGraw Hill, 2022

Other Resources

1. Coastline Library