

El Camino College

COURSE OUTLINE OF RECORD - Official

I. GENERAL COURSE INFORMATION

| Subject and Number: Descriptive Title: | Physical Science 25 Exploring Physical Sciences | |
|---|---|--|
| Course Disciplines: | Chemistry or Physical Sciences or Physics/Astronomy | |
| Division: | Natural Sciences | |
| Catalog Description: | This course is a broad based introductory study of the physical sciences for future elementary and middle school educators. The topics covered are part of the California science standards and are designed to introduce physics and chemistry. Topics include: energy, forces, motion, magnetism, electricity, gravitational interactions, properties of light and sound, changes of state, physical properties, atomic structure, and chemical changes. Drawing from their own observations and laboratory experiments, students will develop concepts and construct models that can predict outcomes of experiments. Note: Physical Sciences 25 is not designed for majors in physics, astronomy, or chemistry. | |

Conditions of Enrollment: Recommended Preparation

English 84

| Course Length: Hours Lecture: Hours Laboratory: Course Units: | X Full Term Other (Specif 2.00 hours per week TBA 4.00 hours per week TBA 3.00 | y number of weeks): |
|--|---|---------------------|
| Grading Method: Credit Status | Letter Associate Degree Credit | |
| Transfer CSU: Transfer UC: | X Effective Date: 12/09/2002 X Effective Date: Fall 2006 | |
| General Education: | | |
| El Camino College: | 1 – Natural Sciences | |
| - | Term: | Other: |
| CSU GE: | B1 - Physical Science | |
| | Term: Spring 2007 | Other: |
| IGETC: | 5A - Physical Science without La | b |

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

- 1. Understand the concepts of kinetic energy, gravitational potential energy, thermal energy, chemical potential energy, and electrical energy.
- Use Newton's Laws of Motion to predict and interpret outcomes of experiments.
- 3. Use the Periodic Table to analyze basic properties of elements.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <u>http://www.elcamino.edu/academics/slo/</u>.

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Learn proper measurement techniques for laboratory experiments.

Laboratory reports

2. Use Newton's First and Second Laws to predict and interpret outcomes of experiments.

Objective Exams

3. Understand the steps of the scientific method.

Quizzes

4. Understand concepts of motion, including position, displacement, speed, velocity, and acceleration.

Homework Problems

5. Describe different forms of energy, how energy is transformed from one form to another, and the Law of Conservation of Energy.

Objective Exams

6. Understand Newton's Third Law (action and reaction forces)

Homework Problems

7. Compare and contrast magnetic, electrostatic, and gravitational interactions.

Objective Exams

8. Describe properties of waves and light

Quizzes

9. Use the Periodic Table to analyze basic properties of elements.

Quizzes

10. Classify substances as elements of compounds.

Quizzes

11. Understand matter and its phase changes.

Objective Exams

12. Distinguish between types of chemical bonds.

Quizzes

13. Perform and describe simple chemical reactions.

Laboratory reports

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

| Lecture or Lab | Approximate Hours | Topic Number | Major Topic |
|-------------------|----------------------|-----------------|--|
| Lecture | 4 | I | Measurement and Fundamental Properties a) Fundamentals of measuring length, area, volume and mass b) Density of materials c) The Scientific Method |
| Lecture | 8 | 11 | Motion, Forces and Energy a) Motion of objects as related through the concepts of position, displacement, speed, velocity, and acceleration b) The relationship between a net force and the motion of an object c) The relationship between net force, work, and kinetic energy d) Action and reaction forces e) Basic forces in the universe including electrostatic, gravitational, and magnetic f) Forms of energy including solar, chemical, magnetic, electric, nuclear, and thermal g) The conservation of energy, and how energy is transformed from one form to another h) The nature of heat (thermal energy) and heat transfer (conductive, convective, radiant) and their relationship to temperature and temperature measurement |
| Lecture | 6 | 111 | Electricity and Magnetism a) Electric charge and how charge is transferred from one object to another b) Models of electric current, voltage, resistance and their interrelationships c) Series and parallel circuits d) Magnetism |
| Lecture | 6 | IV | Waves and Light a) Longitudinal and transverse waves b) Properties of sound c) Doppler effect and interference d) Electromagnetic radiation, the electromagnetic spectrum and sources of light e) Relationship between wavelength and color f) Color perception g) Reflection and refraction of waves |
| Lecture | 6 | V | Structure of Matter a) Atomic theory and basic atomic structure including the relationships between sub-atomic particles b) Periodic Table of Elements and periodic trends c) Atoms and bonding d) Classification of matter—elements, compounds, mixtures |

| | | | e) Basic characteristics of solutionsf) Acids, bases, and pH |
|---------|------------------------|-----|--|
| Lecture | 6 | VI | Matter and its changes a) Phases of matter and phase changes b) Chemical and physical properties and changes c) Basic principles of bonding and chemical reactivity d) Energy changes during chemical reactions |
| Lab | 72 | VII | Laboratory Experiments and Exercises to be chosen from the following: Graphing Motion in Real Time Force, Mass and Acceleration Work on and Inclined Plane Connecting Mass to Weight Projectile Motion Orbital Geometry and Orbital Mechanics Simulation Density, Flotation, and Buoyancy Kinetic Theory Heat Capacity of Water Specific Heat Thermal Emission Circuit Basics Current and Magnetic Fields Waves Radioactive Half-Life Chemical Bonds: Electron Dot Diagrams Separation of a Mixture Chemical Reaction: Measuring Percent Oxygen in Air Solar Energy Pinhole Sun Projection The Size of the Sun |
| Total L | ecture Hours | 36 | 1 |
| Tota | al Laboratory Hours | 72 | |
| | Total Hours | 108 | |

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. PRIMARY METHOD OF EVALUATION:

Problem solving demonstrations (computational or non-computational)

B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

Consider the following pure substances: NaCl and H_2O . Identify the bonds present between atoms and the type of bond (ionic, covalent or metallic) exhibited in each compoound. In a separate paragraph, describe the differences in the bonding present in NaCl compared to H_2O . Describe how these differences affect the physical state, melting and boiling points of the compounds.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

- In a short paragraph, explain how you would magnetize a nail such that the head of the nail becomes a north pole and the pointed end of the nail becomes a south pole. In your explanation, include a microscopic model sketch of what might be different between the unmagnetized and the magnetized nail.
- 2. Examine the diagram below. Rank the four identical bulbs in the circuit according to brightness using the space provided, using 1 as lowest brightness and 4 as highest brightness. In a short paragraph, explain your reasons for the ranking.

D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Essay exams Other exams

Quizzes

- Written homework
- Laboratory reports
- Homework Problems
- **Multiple Choice**
- Completion
- Matching Items
- True/False
- Presentation

V. INSTRUCTIONAL METHODS

Demonstration Discussion Group Activities Laboratory Lecture

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study Answer questions Required reading Problem solving activities Written work Observation of or participation in an activity related to course content Other (specify) Students develop and present teaching activities.

Estimated Independent Study Hours per Week: 4

VII. TEXTS AND MATERIALS

A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS Hewitt, Suchocki, Hewitt. <u>Conceptual Physical Science</u>. 6 ed. Pearson, 2017.

B. ALTERNATIVE TEXTBOOKS

C. REQUIRED SUPPLEMENTARY READINGS

D. OTHER REQUIRED MATERIALS Laboratory Manual for Conceptual Physical Science,6th edition, Hewitt and Baird, 2017

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

| Requisites | Category and Justification | |
|-------------------|----------------------------|--|
| B. Requisite Skil | ls | |
| Requisite Skills | | |

C. Recommended Preparations (Course and Non-Course)

| Recommended Preparation | Category and Justification |
|--|----------------------------|
| Course Recommended Preparation English-84 | |

D. Recommended Skills

| Recommended Skills |
|--|
| Students in this course need to have good reading skills to understand and interpret information in their textbooks. The reading skills developed in English 84 will greatly enhance their chance for successfully completing this course. |

E. Enrollment Limitations

| Enrollment Limitations and Category En | rollment Limitations Impact |
|--|-----------------------------|
|--|-----------------------------|

Course created by Susana Prieto on 05/10/2018.

BOARD APPROVAL DATE: 12/09/2002

LAST BOARD APPROVAL DATE:

Last Reviewed and/or Revised by Susan Stolovy on 05/10/2018