ANTELOPE VALLEY COLLEGE

Academic Affairs
Course Outline of Record

Academic Affairs Only

- ☐ New Course
  - ☐ Effective Date (for articulation)
- ☒ COR Revision 5/28/2009
- ☐ Pre Req/Advisories
- ☐ Other Changes
- ☒ SLOs 4/10/2008

COURSE SUBJECT & NUMBER: PSCI 101

COURSE NAME: *Physical Science

COURSE UNITS: 4

COURSE HOURS: 6 hours weekly (3 hours lecture, 3 hours lab)

COURSE REQUISITES: ***(Follow format of similar courses found in the college catalog.)***
ADVISORY: Completion of ENGL 101 and MATH 102.

COURSE DESCRIPTION: ***(Write a short paragraph providing an overview of topics covered. Be sure to identify target audience--transfer, major, GE, degree/certificate, etc. If repeatable, state the number of times at end of description as (R#)***.
Designed to meet lower division physical science requirements for the non-science major. Introduces basic concepts in physics and chemistry (motion, energy, atoms, and chemical reactions) emphasizing concepts with a minimum of math. Especially recommended for students interested in teaching, library science, and humanities. (CSU, UC, AVC)

COURSE OBJECTIVES: ***(Title 5 requires that courses show evidence of critical thinking skills. Use Bloom's taxonomy to formulate concise, performance-based measurable objectives common to all students. Objectives must be closely aligned with course content, assignments, and methods of evaluation)***

Upon completion of course, the successful student will be able to

1. Measure length, volume, and mass in the metric system (SI).
2. Describe the characteristics of moving objects.
3. Explain Newton's laws and analyze problems involving Newton's laws and friction.
4. Distinguish between energy and force and solve problems involving energy and force.
5. Use and solve problems involving the Law of Conservation of Energy.
6. Describe gravitation and solve problems using the Law of Gravity.
7. Explain the three laws of thermodynamics and be able to draw in/out and source/receiver energy diagrams.
8. Explain electricity and solve problems involving electricity and magnetism.
9. Describe properties of light and how light interacts with shiny and non-shiny objects.
10. Describe temperature and pressure using the Small Particle Theory (SPT).
11. Examine individual gas laws and the Ideal Gas Law using the SPT.
12. Describe characteristics of solids and liquids such as density and phase changes using the SPT.
13. Describe the structure of atoms and explain why different elements can have similar or different properties.
14. Explain how the periodic chart is organized.
15. Differentiate between different atomic bonds and calculate atomic and formula masses.
16. Examine common chemical reactions and balance chemical equations.

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COURSE CONTENT: ***(Enter course content in terms of specific topics or a specific body of knowledge that each instructor must cover. Put topics in outline form with major and minor headings. Each instructor must cover all material listed below.)***

1. Measure length, volume, and mass using the System International (metric system).
    A. Units of measurement
    B. System International
    C. Measurement of length, volume, mass, and density
2. Describe the characteristics of moving objects.
    A. Inertia
    B. Force
        1. Balanced and unbalanced forces
        2. Support (normal) force
    C. Speed and velocity
    D. Acceleration
3. Explain Newton's laws and analyze problems involving Newton's laws and momentum.
    A. Define force
        1. Units
        2. Vectors
        3. Net force
    B. Newton's First Law of Motion
    C. Newton's Second Law of Motion
        1. Acceleration and gravity
        2. Force, mass, and acceleration
    D. Newton's Third Law of Motion
        1. Defining the system
        2. Vectors
4. Distinguish between energy and force and solve problems involving energy and force.
    A. Energy
        1. Kinetic Energy
        2. Potential Energy
        3. Conservation of Energy
    B. Frictional force
    C. Energy and force diagrams
5. Describe gravitation and solve problems involving gravitation and projectile motion.
    A. Universal gravitation
    B. Gravity and distance
    C. Horizontal force—the nature of frictional force
6. Explain the three laws of thermodynamics.
    A. Thermal energy and temperature
    B. Absolute zero
    C. Three laws of thermodynamics
    D. Heat
    E. Specific Heat Capacity
    F. Draw diagrams involving heat flow
7. Explain electricity and magnetism and solve problems involving electricity and magnetism.
    A. Electric force
    B. Electric field—force at a distance
    C. Electric circuits
    D. Magnetic fields
    E. Electrostatic and magnetic interactions
8. Describe the properties of light and how shiny and non-shiny objects interact with light.
    A. Wave characteristics
    B. Light interactions with shiny and non-shiny objects
    C. Electromagnetic spectrum
    D. Light interactions with the eye
    E. Draw light ray diagrams
9. The Small Particle Theory (SPT) for gasses.
    A. Gases, gas pressure, and gas laws
    B. Explaining phenomena involving gas pressure
    C. Pressure differences
    D. SPT and temperature
    E. The Ideal Gas Law
10. SPT for liquids and solids.
    A. SPT and the densities of liquids and solids
    B. Heating liquids and solids—the heating curve of water
    C. Changes of state (phase)
    D. Vapor pressure
    E. Solubility
    F. Dissolving and polarity
11. Describe the structure of atoms and why different elements can have similar or different properties.
    A. Protons, neutrons, and electrons
    B. Isotopes and atomic mass
    C. Orbital
    D. Shell model
12. Explain how the Periodic Table of the Elements is organized.
    A. Periods and groups
    B. Atomic mass.
    C. Characteristics of the different families
13. Differentiate between different atomic bonds and calculate atomic and formula masses.
    A. Ionic bonds
    B. Covalent bonds
    C. Polarity
    D. Metallic bond
    E. Formula mass
14. Examine common chemical reactions and balance chemical equations.
    A. Exothermic and endothermic reactions
    B. Balancing equations
15. Interactions and chemical changes.
    A. Temperature and the rate of chemical changes
    B. Conservation of mass
    C. Chemical changes, solubility, and energy

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TYPICAL HOMEWORK ASSIGNMENTS: (Do not include in-class work, quizzes, or tests)
This information is necessary for all credit courses. Assignments should be closely related to course objectives, content, and methods of evaluation. (See sample of a "Model Outline" in the AP&P Standards & Practices Handbook.) Include a range of assignments (minimum of three) from which faculty may choose when designing their syllabus.

1. ***Describe nature and frequency of typical reading assignments if applicable; note if any are required:***
Weekly reading assignments from the textbook. Along with the in-class lecture, students will have the chance to enhance their learning by reading from specific chapters of the textbook and/or read pertinent information from specific Web sites. Approximately one chapter per week will be assigned, and the instructor will provide hard copies for students with no access to the Internet.

2. ***Describe nature and frequency of typical writing assignments if applicable; note if any are required:***
Weekly collaborative homework assignments that require explicitly written solutions of Context Rich Problems. Weekly laboratory reports.

3. ***Describe nature and frequency of typical computational assignments if applicable; note if any are required:***
Basic arithmetic and algebraic operations. Students will be assigned homework problems on a weekly basis where algebraic operations are needed. These calculations require knowledge of algebraic addition, subtraction, multiplication, division, simplification of fractions, solving equations with one unknown ($3x + 2 = 3 \rightarrow x = 1/3$), and basic graphing.

4. ***Describe other types of homework assignments that students may be asked to complete (oral presentations; special projects; visual/performing arts; etc); note if any are required:***

For categories 1-4 above, list the estimated hours per week it would take a student to complete assignments. *Title 5 (section 55002)* requires that *each unit must be shown to require three hours of work per week by the student either in or out of class.* Homework formula: 3 hours of class work *times* each unit of credit *minus* classroom hours *equals* required homework hours.

Reading Assignments: 3 ***Writing Assignments***: 2

Computational Assignments: 1 ***Other Assignments***:

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METHODS OF INSTRUCTION: ***(Methods must be consistent with content and appropriate to objectives; state in terms of what instructor will be doing in order to present course content to students: for example, lecture, demonstration, present audio/visual materials; facilitate group work, etc. Do <u>not</u> list specific instructional equipment.)***

Active learning methods such as instructor facilited demonstrations, computer simulations, discovery-based hands-on activities, collaborative problem solving. Students will develop their own conceptual models about various physical processes by using the following four phase technique: Predict, Test, Discuss, Revise.
The role of the instructor is to actively guide students during each phase using techniques such as the Socratic Dialogue approach.

METHODS OF EVALUATION: ***(These must be clearly related to course objectives and reflect course content and assignments in order to comply with Title 5 requirements. <u>Describe what instructor will be looking for when evaluating various assignments and tests in order to determine whether students have met course objectives.</u> Grades must be based on demonstrated proficiency in subject matter and determined, where appropriate, by essays, objective and essay tests, research papers or projects, problem solving exercises, or skills' demonstrations.)***

Grading of exams and a comprehensive final exam that will assess students' abilities to:
a) solve numerical problems (objectives 1-6, 8)
b) analyze idealized physical situations using graphical and mathematical analysis (objectives 1-6, 8)
c) apply physics and chemistry content knowledge in describing, analyzing, and solving real life problems (objectives 1-16)
Grading of weekly homework assignments that are designed to enhance student comprehension and problem solving ability.

Suggested Texts or Other Instructional Materials
(List several when possible; include title, author, publisher, date, and latest edition. If older than five years, provide brief rationale.)
Physical Science and Everyday Thinking, second edition by Fred Goldberg, et. al.; January 2009.