San Bernardino Valley College
Curriculum Approved: FA01

I. CATALOG DESCRIPTION

A. Department Information:

Division: Science & Math
Department: Physical Sciences
Course ID: PS 101
Course Title: Introduction to Physical Science
Units: 3
Lecture: 3 hours
Laboratory: 0 hours
Prerequisite: None

B. Catalog Description

Fundamental concepts of chemistry, physics, and earth sciences (astronomy, geology, and oceanography) as they apply to everyday life.

C. Schedule Description

Fundamental concepts of chemistry, physics, and earth sciences (astronomy, geology, and oceanography) as they apply to everyday life.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS

Upon completion of the course, the student should be able to:

A. apply the unifying principles which underlie the various branches of scientific endeavor to situations encountered in every day life,
B. identify the basic physical concepts necessary for an understanding of the science and technology of the natural environment, and
C. understand each person's role as a member of a society that is increasingly dependent on scientific and technological development.

IV. CONTENT

A. Background
   1. Early Concepts of Nature
   2. The Golden Age of Astronomy
   3. Basic Units of Time, Space, Mass, Energy, Motion
   4. Universal Gravitation
B. Mechanical Phenomena
   1. Energy, Work, and Power
   2. Vibration Waves and Sound
   3. Electricity and Magnetism
   4. Electromagnetic Spectrum
   5. Relativity
C. Structure of Matter
   1. The Atom
   2. Radioactivity and Nuclear Energy
   3. The Periodic Nature of Elements
   4. States of Matter
D. Chemistry of Matter
   1. Chemical Energy
   2. Chemistry of Living Organisms

E. The Dynamic Earth
   1. Earth's Structure
   2. Plate Tectonics
   3. Oceans and Atmosphere
   4. Earth-Moon Binary System

F. The Solar System
   1. Terrestrial Planets
   2. Jovian Planets
   3. Asteroids, Comets, and Meteors

G. Beyond the Solar System
   1. Stars and Nebulae
   2. Galaxies
   3. The Universe
   4. Extraterrestrial Life

V. METHODS OF INSTRUCTION:

Instructors will include some or all of the following instructional components:

A. Classroom lecture. May be accompanied by activities such as demonstrations, video, film, and computer simulations. Specific reading assignments to reinforce and extend classroom presentations.
B. Demonstration experiments evoking discussion and problem solving.
C. Computer aided instruction.
D. Written assignments involving the solution of problems illustrative of various physical situations.
E. Students will utilize critical thinking in performance of specific problem solving strategies.
F. Students write and summarize their observations of demonstration experiments. Writing includes background, data analysis, and documentation of principles and apparatus.
G. Other written assignments such as library research including analysis of current popular scientific literature.

VI. TYPICAL ASSIGNMENTS:

A. Reading Assignments

Read the section on Newton's Three Laws of Motion. Pay particular attention to the concept of net force and vectors. Examples of importance include weight and friction.

Learning Goals: You should understand:

The concepts of vector and scalar, and be able to distinguish between them.
How to add and subtract vectors
What is meant by inertia.
Newton's First Law.
The concept of momentum: $p = mv$.
Newton's Second Law in the general form F_{net} = ma and $F_{net} = \Delta p / \Delta t$ as a special case.
Newton's Third Law
What is meant by net force, and be able to find the net force for a given set of forces.
The units used for mass and force.
The concept of weight.
How friction affects the motion of objects.
The application of Newton's Laws to simple situations.

B. Writing Assignments
   1. Selected chapter exercises from the textbook.
   2. Critical analysis of an article from the popular science or technology popular literature.
   3. Instructor-prepared exercises, especially those involving graphs, tables, maps, charts, diagrams, cross-sections and their analysis.

VII. EVALUATION:

A. Methods of evaluation will vary with the instructor, and may include some or all of the following components.
   1. Objective tests which may include true-false, multiple choice, and matching items.
   2. Subjective tests which may include completion items and essay questions.
   3. Problem solutions
   4. Projects
   5. Written assignments as described in V above.

B. Frequency of evaluation:
   1. There are typically three to five exams during the semester.
   2. Other, more frequent evaluation techniques, such as quizzes, may be utilized.

C. Typical exam questions:
   1. A ball is thrown upward with an initial velocity of 25 m/s from the edge of a cliff. When does the ball reach it highest point? *Show all work for credit.*
   2. Which of the following features must an atomic model have *to explain* the way alpha particles pass through a thin, gold foil?
      a. an atom must contain electrons
      b. an atom must have a small, positively charged, massive nucleus
      c. electrons must have a negative charge
      d. an atom must have definite energy levels
      e. all of these
   3. For the reaction given, how many moles of water will be produced when 8.0 moles of $KMnO_4$ are consumed?
   4. Compare, at the same temperature and pressure, equal volumes of hydrogen and oxygen as to: the number of molecules, mass, number of moles, average kinetic energy, rate of effusion, and density.

VIII. TYPICAL TEXT(S)

Hewitt, Suchocki and Hewitt, *Conceptual Physical Science*, 2nd ed., Addison Wesley Longman, 1999

Dixon, Robert T., *Physical Science – A Dynamic Approach*, 2nd ed., Prentice-Hall, Inc., 1999

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Calculator