El Camino College

COURSE OUTLINE OF RECORD - Official

I. GENERAL COURSE INFORMATION

Subject and Number: Physics 12
Descriptive Title: Laboratory for Introductory Physics

Course Disciplines: Physics/Astronomy

Division: Natural Sciences

Catalog Description: This laboratory course is designed to give the student an opportunity to experimentally reinforce some of the fundamental concepts of physics studied in Physics 11.

Conditions of Enrollment: **Prerequisite**

Physics 11
with a minimum grade of C or

Concurrent Enrollment

Course Length: [X] Full Term [ ] Other (Specify number of weeks):
Hours Lecture: 0 hours per week [ ] TBA
Hours Laboratory: 3.00 hours per week [ ] TBA
Course Units: 1.00

Grading Method: Letter
Credit Status Associate Degree Credit

Transfer CSU: [X] Effective Date: Prior to July 1992
Transfer UC: [X] Effective Date: Prior to July 1992

General Education:

El Camino College: **1 – Natural Sciences**
Term: Other:

CSU GE: **B1 - Physical Science**
Term: Other: Approved
B3 - Laboratory Sciences
Term: Other: Approved

IGETC: **5C - Science Laboratory**
Term: Fall 1991 Other:

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. Given the units and proper number of significant figures for data that might be collected during a Physics 12 level lab, the student should then be able to take a provided relationship between the data (i.e., a formula) and properly determine the units, value, and correct number of significant figures of the calculated result.

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 http://www.elcamino.edu/academics/slo/.

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. Demonstrate proper use of vernier calipers, triple-beam and pan balances, thermometers, and other basic laboratory measuring devices;

   Laboratory reports

2. Properly use scientific notation and significant figures in data manipulation and assigned problems;

   Quizzes

3. Verify some of the fundamental laws of physics (e.g.: Newton's Laws, Conservation of Energy, Archimedes Principle), through experimentation;

   Laboratory reports

4. Calculate values of certain physical constants such as specific heats, coefficient of linear expansion, speed of sound, and others utilizing experimental data.

   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
Lab	3	I	Measurement and Density
Lab	3	II	The Acceleration due to Gravity
Lab	3	III	Newton's Second Law
Lab	3	IV	Vector Quantities and the Force Table
Lab	3	V	Simple Machines
Lab	3	VI	The Ballistic Pendulum
Lab	3	VII	Center of Gravity and Rotational Equilibrium
Lab	3	VIII	Uniform Circular Motion
Lab	3	IX	Simple Harmonic Motion
Lab	3	X	Archimedes' Principle

Lab	3	XI	Coefficient of Linear Expansion
Lab	3	XII	Specific Heat
Lab	3	XIII	Heats of Fusion, Vaporization, and Sublimation
Lab	3	XIV	Standing Waves in Strings
Lab	3	XV	Velocity of Sound in Air by Resonance
Lab	3	XVI	Reflection and Refraction of Light Rays
Lab	3	XVII	Measurement of Focal Length of Lenses
Lab	3	XVIII	Ohm's Law
Total Lecture Hours		0	
Total Laboratory Hours		54	
Total Hours		54	

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:**

Sketch a(t) and V(t) for a trip in which you start from rest with an acceleration of 30 mph/min which you maintain for two minutes followed by a period of one minute at constant speed followed by a final minute during which you slow to a rest. Calculate how far you moved in each section of the trip shown above. (There should be three sections in the trip above.)

C. **COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:**

1. Carefully observe the cylinder whose volume you just measured, and then your index finger. Now estimate to a reasonable number of significant figures the volume (in cm3) of your finger. Make the necessary measurements to calculate the volume of your finger. Draw clear sketches showing where and what kind of measurements are being made. EXPLAIN YOUR METHOD.
2. Give an argument as to why a more massive, object would take longer to traverse the 100 cm to the bottom of an incline than a less massive object. Conversely, now give an argument as to why a more massive object would take less time to arrive at the bottom of the incline than a less massive object. What really happened? Give a reason for the results. (Perform the experiment)

D. **OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**

Laboratory reports

Class Performance

Multiple Choice

Completion

Matching Items

True/False

V. INSTRUCTIONAL METHODS

Demonstration
Discussion
Laboratory
Lecture
Other (please specify)

Instructional techniques will include a short lecture over the theory underlying a given experiment and usually a demonstration of how the equipment is to be set up. Additionally, especially during the first few weeks of class, formal lectures on elementary error theory are given during the first hour of each meeting.

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

Course is lab only - minimum required hours satisfied by scheduled lab time and estimated student hours outside of class per week is zero.

Estimated Independent Study Hours per Week:

VII. TEXTS AND MATERIALS

A. **UP-TO-DATE REPRESENTATIVE TEXTBOOKS**
Leon Leonardo. Laboratory Manual for Introduction to Physics. El Camino College Bookstore, 2007.
Qualifier Text: Discipline Standard,

B. **ALTERNATIVE TEXTBOOKS**

C. **REQUIRED SUPPLEMENTARY READINGS**

D. **OTHER REQUIRED MATERIALS**

VIII. CONDITIONS OF ENROLLMENT

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

Requisites	Category and Justification
Course Prerequisite Physics-11	Sequential

B. Requisite Skills

Requisite Skills
Ability to make qualitative predictions using the basic laws of Physics. PHYS 11 - Distinguish between Newton's Laws of Motion for linear and non-linear motion, work, energy, impulse and momentum.PHYS 11 - Explain the significance of Newton's Laws of Motion, work and energy, and momentum.
Ability to determine the relative importance of different data in computing the values of physical quantities. PHYS 11 - Explain conceptually/qualitatively physical phenomena in terms of specific principles of physics.PHYS 11 - Make qualitative predictions about the outcome of a natural physical event using specific principles of physics.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification

D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by General Physics Faculty, D. Joalin, J.S. Miller, M. Feero, J. Platts on 02/01/1969.

BOARD APPROVAL DATE:

LAST BOARD APPROVAL DATE:

Last Reviewed and/or Revised by Susana Prieto on 10/22/2013

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