Las Positas College
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Course Outline for PHYS 10L

DESCRIPTIVE PHYSICS LAB

Effective: Fall 2019

I. CATALOG DESCRIPTION:
PHYS 10L — DESCRIPTIVE PHYSICS LAB — 1.00 units

Introduction to laboratory principles and techniques with emphasis on the basic concepts of physics such as mechanics, thermodynamics, energy, electricity, magnetism, and optics.

1.00 Units Lab

Prerequisite
MATH 55 - Intermediate Algebra for STEM
with a minimum grade of C

Corequisite
PHYS 10 - Descriptive Physics
(may also be taken after successful completion of PHYS 10)

Grading Methods:
Letter Grade

Discipline:
- Physics/Astronomy

	MIN
Lab Hours:	54.00
Total Hours:	54.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:
Before entering the course a student should be able to:

A. MATH55
1. Recognize and determine the distinctions between relations and functions, numerically, graphically, symbolically, and verbally;
2. Solve polynomial, rational, absolute value, radical, linear, exponential, and logarithmic equations;
3. Apply basic operations on functions, including composition of functions and finding inverse functions;
4. Develop and use equations or function models to analyze and solve applied problems involving linear, quadratic, rational, radical, exponential or logarithmic expressions. Topics should minimally include growth, decay, geometry, optimization and uniform motion.
5. Use the properties of radicals, complex numbers, exponents and logarithms;
6. Sketch the graphs of nonlinear relations, including parabolas and circles, and identify key components of the graphs;

IV. MEASURABLE OBJECTIVES:
Upon completion of this course, the student should be able to:

A. Conduct and/or design experiments to measure physical quantities and validate theoretical predictions.
B. Analyze laboratory data using computer- and calculator-based spreadsheet and graphing applications.
C. Operate standard laboratory equipment, including digital data acquisition systems.
D. Perform experiments using interactive computer-based simulations of physics phenomena and analyze the results.
E. Write comprehensive laboratory reports (including the introduction, methods, data analysis, and conclusions).

V. CONTENT:
A. Measurement of Physical Quantities
1. Standards of length, mass, and time.
2. Dimensional analysis.
3. Uncertainty in measurements
4. Significant figures.
5. Conversion of units.
6. Order-of-magnitude calculations.
7. Coordinate systems.
B. Principles of laboratory safety and use of laboratory equipment.

C. Experiments and investigations of physics principles
    1. Motion in one and two dimensions
    2. Instantaneous speed, velocity, and acceleration.
    3. Applications of Newton's laws
    4. Verification of conservation laws (such as energy, momentum, or angular momentum)
    5. Relationships between temperature, pressure, volume, and other thermodynamic quantities
    6. Wave Motion
    7. Electric force, electric field, and electric potential
    8. Magnetic force, magnetic field, and electromagnetic induction
    9. Electric circuits
    10. Optics, lenses, and simple telescopes.
    11. Modern physics (such as nuclear and/or particle physics)

VI. METHODS OF INSTRUCTION:
A. **Lab** -
B. **Classroom Activity** - Individual and group skill building activities (may include problem worksheets, hands-on experimentation, movies, and/or computer simulations)
C. **Lecture** - A brief summary of relevant physics concepts may precede experiments.

VII. TYPICAL ASSIGNMENTS:
A. Weekly laboratory experiments
B. Weekly or biweekly laboratory reports (or assigned at the discretion of the instructor)

VIII. EVALUATION:
Methods/Frequency

A. Exams/Tests
    final exam
B. Projects
    one
C. Group Projects
    one
D. Lab Activities
    weekly

IX. TYPICAL TEXTS:

1. Muller, Richard. *Physics and Technology for Future Presidents.* 1st ed., Princeton University Press, 2010.
2. Hewitt, Paul. *Conceptual Physics.* 12th ed., Pearson, 2015.
3. Griffith, W., and Juliet Brosing. *Physics of Everyday Phenomena.* 9th ed., McGraw-Hill, 2019.
4. Ostdiek, Vern, and Donald Bord. *Inquiry Into Physics.* 8th ed., Cengage, 2018.
5. Las Positas College Faculty. LPC Physics 10L Lab Manual. online , 2017.

X. OTHER MATERIALS REQUIRED OF STUDENTS:
A. Computer and Internet Access
B. Calculator