PHYS M01L: DESCRIPTIVE PHYSICS LABORATORY

Originator
ereese

College
Moorpark College

Discipline (CB01A)
PHYS - Physics

Course Number (CB01B)
M01L

Course Title (CB02)
Descriptive Physics Laboratory

Banner/Short Title
Descriptive Physics Lab

Credit Type
Credit

Start Term
Spring 2021

Catalog Course Description
Examines the basic phenomena in mechanics, thermodynamics, wave motion, electromagnetism, optics, and modern physics. Introduces the use of common real-world modern laboratory instruments, learned and practiced during the experiments. Teaches elementary principles of data taking, data reduction, synthesis, and analysis, as well as the writing of scientific reports.

Taxonomy of Programs (TOP) Code (CB03)
1902.00 - Physics, General

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will not be required

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture

Activity

Laboratory
Minimum Contact/In-Class Laboratory Hours
52.5
Maximum Contact/In-Class Laboratory Hours
52.5

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5
Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
52.5
Total Maximum Student Learning Hours
52.5

Minimum Units (CB07)
1
Maximum Units (CB06)
1

Prerequisites
PHYS M01 or concurrent enrollment

Entrance Skills

Prerequisite Course Objectives
PHYS M01-recognize, recall, and apply the simplified equations that describe physical phenomena involving mechanics, thermodynamics, wave motion, electromagnetism, optics, and modern physics.
PHYS M01-demonstrate ability to solve elementary physics problems.
PHYS M01-demonstrate ability to analyze and synthesize physics problems of elementary complexity and evaluate and judge the results of the solutions to these problems.

Requisite Justification

Requisite Type
Prerequisite

Requisite
PHYS M01

Requisite Description
Course not in a sequence

Level of Scrutiny/Justification
Closely related lecture/laboratory course

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	discern between relevant and irrelevant evidence, formulate appropriate hypotheses, and distinguish between experiments to determine which one(s) leads to an appropriate conclusion.
2	apply the scientific method and use the different parts to study the physical world.
3	apply intermediate principles to solve problems involving kinematics, force, energy, momentum, waves, and thermodynamics.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	construct experiments in mechanics, thermodynamics, wave motion, electromagnetism, optics, and modern physics.
2	make measurements and record the data.
3	reduce and analyze the data and write about the experiment and its results using the appropriate language of technical writing.
4	critically evaluate the experimental results in light of accepted values and/or other relevant information and draw conclusions regarding the experimental procedures.

Course Content

Lecture/Course Content

N/A

Laboratory or Activity Content

- 9% - Uncertainty and measurement
- 7% - Free fall
- 7% - Projectile motion
- 7% - Mechanical advantage
- 7% - Work and energy
- 7% - Archimedes' principle
- 7% - Specific heat
- 7% - Ohm's law
- 7% - Diode rectifier
- 7% - Rocket Propulsion
- 7% - Properties of sound
- 7% - Mirrors and lenses
- 7% - Hydrogen spectrum
- 7% - Absorption of radiation

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Group projects
Individual projects
Laboratory activities
Laboratory reports
Oral analysis/critiques
Objective exams
Oral presentations
Problem-solving exams
Quizzes
Reports/Papers/Journals
Reports/papers
Research papers
Skills demonstrations
Skill tests or practical examinations

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Computer-aided presentations

Collaborative group work
Class activities
Class discussions
Distance Education
Demonstrations
Group discussions
Guest speakers
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Laboratory activities
Practica
Small group activities

Describe specific examples of the methods the instructor will use:

For each lab activity the instructor will:

- explain the applicable theory and background information,
- explain the use of technology and instrumentation as appropriate,and
- demonstrate the data collection and analysis techniques as appropriate.

Representative Course Assignments

Writing Assignments

- Prepare formal laboratory reports which conform to the technical paper style as guided by the instructor. An example is an analysis of the mechanical advantage lab including an abstract, data presentation, detailed analysis, and conclusion.
- Write conclusions and analyses in informal laboratory reports using an appropriate technical language style, and respond to questions that require an essay or a brief answer.

Critical Thinking Assignments

- Compare and contrast the various ways the vector addition of forces can be demonstrated (mathematically, graphically, and experimentally), and discuss the advantages and disadvantages of each technique.
- Analyze the experiment and collected data to define its goals and correct conclusions. Interpret results to answer the question of whether the data are consistent with theory or not. Based on the results, discuss potential sources of error and potential improvement for the lab.

Reading Assignments

- Read the relevant sections of the course laboratory manual and/or handouts distributed by the instructor to prepare for the weekly experimental work.
- Research how the concepts applied in the labs of this course apply to real-world examples by using library resources (both physical and online) and other credible sources. For example, apply concepts learned and experimental techniques developed for properties of waves to patterns formed when objects are dropped into ponds or cups of water.

Skills Demonstrations

- Demonstrate how to use the meter stick to measure a length and determine the associated uncertainty in that measurement.
- Demonstrate how to use a vernier scale to measure the weight of an object, measure the dimensions using calipers, and finally measure the density of that object.

Other assignments (if applicable)

None

Outside Assignments

Representative Outside Assignments

- Analyze the collected data and interpret plots, to report results and answer the question of whether the data are consistent with theory or not in your formal lab report.
- Research real-world examples that apply physics principles covered in lab. For example, the mechanical drive on a bicycle is just a series of connected levers and gears connected to work together. If you want to maximize your force output during a high demand activity, like going up a hill, what kind of “gear shift” is most convenient, and why?

Articulation

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
CSU, Sacramento	PHYS 10L	Physics in Our World Laboratory	1
San Diego State Univ.	PHYS 195L	Principles of Physics Laboratory	1
San Jose State Univ.	PHYS 1L	Elementary Physics Lab	1

Comparable Courses within the VCCCD
PHYS V01 - Elementary Physics

District General Education

A. Natural Sciences

A2. Physical Science
Approved

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
F1995

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B3 Laboratory Activity
Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

UC TCA

UC TCA
Approved

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 5C: Laboratory Science
Approved

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Manual

Description
Robinson, Paul. *Laboratory Manual for Conceptual Physics.* 11th ed.*,* Pearson, 2010.

Resource Type
Manual

Description
Hewitt, Paul, and Dean Baird. *Laboratory Manual: Activities, Experiments, Demonstrations and Tech Labs for Conceptual Physics.* 12th ed., Pearson, 2014.

Resource Type
Manual

Description
Laboratory manuals are typically developed on-site:
Harper, Clinton. *Physics 1 Laboratory Manual (*Version 2.8.2). Sunshine Publishing, 2012.

Library Resources

Assignments requiring library resources
None

Sufficient Library Resources exist
Yes

Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	The instructor will post a problem relevant to concepts covered in the Physics M01L class which can be solved using 2 or 3 different methods. The instructor will then invite the students to comment on each methodology in terms of the application of the appropriate physics problem-solving techniques and suggest ways to improve the solutions to the posed problem.
E-mail	The instructor will email students with announcements about the course or an upcoming event. Students, in turn, may email the instructor with their questions or concerns. Depending on the situation, the students may also email their assignments or projects directly to the instructor, instead of posting it on the class web page.
Face to Face (by student request; cannot be required)	Students will have the option to meet the instructor in his/her office on campus in a classroom to work on problem-solving exercises in the presence of the instructor to get one-on-one help from the instructor. Also, the students may want to meet the instructor to have a face-to-face discussion about an issue of concern.
Other DE (e.g., recorded lectures)	Students will upload their assignments to the course webpage to be graded by the instructor.
Synchronous Dialog (e.g., online chat)	The instructor may also require students to be present on-line during certain hours of the week and have a dialogue with one another; for example, a student may post a question about solving a problem and other students will try to answer his/her question. This would be a live discussion session.
Telephone	The instructor may provide a phone number to the students where they can leave a voicemail and expect a call back within 24 hours.
Video Conferencing	The instructor may be available on a certain day or days of the week within a certain time frame to help students and answer their questions via live video conferencing. This would be the equivalent of on-line office hours. Also, the instructor may choose to present a lecture to the students via video conferencing.

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100% online Modality:

Method of Instruction	**Document typical activities or assignments for each method of instruction**
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Examinations

Hybrid (1%–50% online) Modality
Online
On campus

Hybrid (51%–99% online) Modality
Online
On campus

Primary Minimum Qualification
PHYSICS/ASTRONOMY

Review and Approval Dates

Department Chair
9/29/2020

Dean
9/29/2020

Technical Review
10/15/2020

Curriculum Committee
10/20/2020

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
11/18/2020

Control Number
CCC000433179

DOE/accreditation approval date
MM/DD/YYYY