PHYS R101L: COLLEGE PHYSICS 1 LABORATORY

Originator
jwmiller

College
Oxnard College

Discipline (CB01A)
PHYS - Physics

Course Number (CB01B)
R101L

Course Title (CB02)
College Physics 1 Laboratory

Banner/Short Title
College Physics 1 Laboratory

Credit Type
Credit

Start Term
Fall 2021

Catalog Course Description
This course is the laboratory that complements PHYS R101, which may be taken either previously or concurrently. It provides students with opportunities to learn and apply the scientific method through investigations of the phenomena discussed in that course. It also introduces students to methods of computer-assisted data analysis.

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
Letter Graded

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 R101 or concurrent enrollment

Entrance Skills

Entrance Skills
The students are expected to have prior knowledge of the theory regarding the material for a given laboratory experiment.

Prerequisite Course Objectives
PHYS R101-Draw a diagram or cartoon that clearly and usefully depicts the salient features and characteristics of a mechanical or thermodynamic system, and is labeled or annotated so that known and unknown quantities can readily be determined by examination of the diagram and other written information that accompanies it.
PHYS R101-Analyze a simple mechanical or thermodynamic system to identify applicable principles (e.g., conservation laws) that may be used to predict the future behavior or evolution of the system.
PHYS R101-Solve conceptual and numerical problems related to the behavior or evolution of a mechanical or thermodynamic system by applying those principles identified above.
PHYS R101-Employ appropriate mathematical tools to solve a variety of equations encountered in the study of physics, including geometric/graphical approaches, approximation techniques, and/or numerical methods.
PHYS R101-Argue for or against a scientific hypothesis, supporting their conclusions by describing how various physical principles might apply to a novel situation.

Requisite Justification

Requisite Type
Concurrent

Requisite
PHYS R101

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Closely related lecture/laboratory course

Requisite Type
Prerequisite

Requisite
PHYS R101

Requisite Description
Course 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	Determine the centripetal force exerted on a mass rotating about a fixed axis.
2	Construct a graph of average velocities with respect to their corresponding time intervals and use the graph to determine the constant gravitational acceleration undergone by a mass in freefall.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Design, construct, execute, record, analyze, and interpret the results of a simple scientific experiment intended to measure the value of a fundamental physical quantity or to verify a basic physical principle.
2	Detect, classify, analyze, quantify, and report sources or causes of random and systematic errors.
3	Prepare well-designed tables, charts, graphs, or other visual aids to clarify the presentation of experimental results.
4	Record, tabulate, and graph experimental data using a computer in conjunction with special-purpose laboratory or mathematical software as well as general-purpose programs such as electronic spreadsheets.

Course Content

Lecture/Course Content

1. Experimental uncertainty (error) and data analysis, including least-squares linear regression and computation of mean and standard deviation
2. Computer analysis of data
3. Measuring the height of a flagpole
4. The scientific method: The simple pendulum
5. Uniformly accelerated motion
6. The addition and resolution of vectors
7. Newton’s second law: The Atwood machine
8. Conservation of linear momentum
9. Projectile motion: The ballistic pendulum
10. Centripetal force
11. Friction
12. Simple machines: Mechanical advantage and efficiency
13. Torques, equilibrium, and center of gravity
14. Hooke’s law and simple harmonic motion
15. Archimedes’ principle: Buoyancy and density
16. Air column resonance: The speed of sound in air
17. The thermal coefficient of linear expansion

Laboratory or Activity Content

1. Experimental uncertainty (error) and data analysis, including least-squares linear regression and computation of mean and standard deviation
2. Computer analysis of data
3. Measuring the height of a flagpole
4. The scientific method: The simple pendulum
5. Uniformly accelerated motion
6. The addition and resolution of vectors
7. Newton’s second law: The Atwood machine

8. Conservation of linear momentum
9. Projectile motion: The ballistic pendulum
10. Centripetal force
11. Friction
12. Simple machines: Mechanical advantage and efficiency
13. Torques, equilibrium, and center of gravity
14. Hooke's law and simple harmonic motion
15. Archimedes' principle: Buoyancy and density
16. Air column resonance: The speed of sound in air
17. The thermal coefficient of linear expansion

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
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):

Essays
Group projects
Laboratory activities
Laboratory reports
Problem-Solving Assignments

Instructional Methodology

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

Distance Education
Laboratory activities
Small group activities

Describe specific examples of the methods the instructor will use:

1. Distance education: Laboratory activities, as noted below, will take place in a virtual setting. The experiments will be tailored to utilize computer simulations, prerecorded data acquisition, live online meetings, and message boards where questions can be asked and answered.
2. Laboratory activities: Each week the students will perform a laboratory experiment investigating certain aspects of a system that has been discussed in lecture. These experiments will direct the students such that the intricacies of a given system are explored and compared to theoretical expectations. For instance, in the projectile motion lab students will launch a projectile and make measurements of displacements and time intervals to determine the initial velocity of the system. Results are then compared to the theory covered in class regarding projectile motion.
3. Small group activities: The students will work in small groups while performing the experiments where applicable

Representative Course Assignments

Writing Assignments

1. Most lab reports require students to answer short essay-style pre-lab and post-lab questions that have them anticipate or reflect on conceptual or practical issues that arise during the course of experimentation, and/or to discuss sources and likely magnitudes of experimental error.

Critical Thinking Assignments

1. Students will compile and analyze experimental data using tabular, graphical or computational methods; the results of this process are an integral part of the lab reports that students will submit each week.

Reading Assignments

1. Before each experiment, students will read about the investigation to be performed, including the underlying theory (principles and likely sources of error) and the experimental procedure itself.

Skills Demonstrations

None

Other assignments (if applicable)
None

Outside Assignments

Articulation

C-ID Descriptor Number
PHYS 105

Status
Approved

Additional C-ID Descriptor(s)

C-ID Descriptor(s)	Status
PHYS 100S (PHYS R101/L + PHYS R102/L)	Approved

Comparable Courses within the VCCCD
PHYS M10AL - General Physics I Lab
PHYS V02AL - General Physics I Laboratory: Algebra/Trigonometry-Based

District General Education

A. Natural Sciences

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:
Fall 2006

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
Miller, J.W. (2020). *Physics Lab Experiments*. Oxnard, Justin Miller.

Resource Type
Other Resource Type

Description
Supplemental handouts for selected experiments prepared by the instructor..

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
Other DE (e.g., recorded lectures)	Recordings of data acquisition and/or simulation use regarding a given lab experiment may be used.
Asynchronous Dialog (e.g., discussion board)	Discussion boards will be used to allow students to discuss and ask questions pertaining to a given experiment.
Synchronous Dialog (e.g., online chat)	Online meetings will be held to go over the experiment at hand and discuss how to proceed with the given experiment. Recordings will be made of all class meetings. Students may also be put into groups to work on a given experiment/activity.
Face to Face (by student request; cannot be required)	Face to face meetings may be scheduled when needed.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	Recordings of data acquisition and/or simulation use regarding a given lab experiment may be used.
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Face to Face (by student request; cannot be required)	Face to face meetings may be scheduled when needed.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	Recordings of data acquisition and/or simulation use regarding a given lab experiment may be used.
Asynchronous Dialog (e.g., discussion board)	Discussion boards will be used to allow students to discuss and ask questions pertaining to a given experiment.
Synchronous Dialog (e.g., online chat)	Online meetings will be held to go over the experiment at hand and discuss how to proceed with the given experiment. Recordings will be made of all class meetings. Students may also be put into groups to work on a given experiment/activity.

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
09/02/2020

Dean
09/02/2020

Technical Review
09/23/2020

Curriculum Committee
09/23/2020

DTRW-I
MM/DD/YYYY

Curriculum Committee
11/25/2020

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000418783

DOE/accreditation approval date
MM/DD/YYYY