

Syllabus for PHYS 4AL Laboratory for Mechanics and Wave Motion

Spring 2026

California State University, Fresno

Course Information

Units: 1

Instructor Name: Professor Ringwald

Email: ringwald@csufresno.edu

Lab Time: We Noon-2:50 p.m.

Location: McLane 264

Course Website:

<https://zimmer.fresnostate.edu/~fringwal/Ringwald-4AL-lab-syllabus-2026S.pdf>

Course Description

This one-unit course will introduce the experiments associated with fundamentals of Newtonian mechanics, the physics of fluids, and development of simple harmonic oscillations, which students learn from PHYS 4A.

Course Format

This course will include assigned readings in your lab manual that should be completed “before” each lab. Prelab activities need to be completed before each session starts. During the lab session there will be typically a quiz at the beginning of the session, short review of material, demonstration how to set up apparatus, and experiments and data analysis will be performed by students.

What You Will Need to Purchase for this Course

The PHYS 4A Laboratory Manual can be purchased at the University Bookstore. Please do so *as soon as possible* and well BEFORE the first lab session.

GE ePortfolio Assignment

The ePortfolio assignment for this course is to upload any of your completed labs. Please upload this assignment to your ePortfolio when it is completed. This assignment aligns with the Learning Outcomes given on page 3 of this lab syllabus.

Lab Reports

Lab Reports

Standard Format and Required Contents of Scientific Report for PHYS 4AL

- (I) Introduction and theory
- (II) Data Collection and Report
- (III) Data analysis and Graph
- (IV) Questions and Problems
- (V) Conclusion
- (VI) Pre-Lab Activity

How will lab reports be graded?

The grade of a lab report will be determined by these criteria:

Introduction and theory	4/20
Data Collection and Report	4/20
Data Analysis and Graph	4/20
Questions and Problems	3/20
Conclusions	3/20
Pre-Lab Activity	2/20

- ◆ Each report must have a cover sheet attached, which will be provided to you by your lab instructor.
- ◆ All reports must be turned in before you leave the lab.
- ◆ Students are allowed to drop one worst grade of the lab reports.

Study Expectations

Prior to the Lab session. Students are required to read and understand the pertinent section(s) in the lab manual before you come to the lab. Seek help from your instructor or the Physics Department tutors if you have questions about the lab or the lecture. You are expected to have read and understand the section on Laboratory Policy as well as the appropriate sections in the University Catalog.

Attendance to the lab is mandatory. A student is not allowed to enter the lab room if the student is more than 10 minutes late for the lab and it will be counted as a missing lab. If a student misses more than two labs, the student will automatically fail the course. Each student will submit one's own lab report at the end of each lab although some students will work in groups of 2-3 people (due to limitations of lab equipment). Students may not use any data or reports from other lab sessions or years or copy data from lab mates, which are not taken by the student's participation. If one does so, it will be considered as cheating and plagiarism. Anyone caught cheating or plagiarizing will be dealt with in accordance to the Policies and Regulations as spelled out in University Catalog, www.fresnostate.edu/catalog/

Free Physics tutoring is provided by the Learning Center: visit <https://studentaffairs.fresnostate.edu/lrc/>

Grading (100%)

Reports: 70% (No final exam)

Quizzes: 30 % (No final exam)

- ◆ You are allowed to waive "one" worst grade from lab reports
- ◆ Grades will "not" be curved. If you have questions about any quiz or lab report, you need to contact the instructor within one week you receive your graded quiz or lab report.
- ◆ **If you miss more than 2 labs you will automatically fail the 4AL course.**

Final letter grade

Final letter grade will be assigned on a 100-point scale as follows:

A	100.000 - 90.000	B	89.999 - 80.000
C	79.999 - 70.000	D	69.999 - 55.000
F	54.999 - 0.000		

Course Goals and Learning Outcomes

Course Goals

The main goal of the laboratory course will be to assist students in learning to describe, analyze, and predict the motions of objects by Newton's laws of motion and gravity (which implies that these objects are large, relative to atoms, and move at speeds much slower than the speed of light). From performing the experiments and analyzing the data, students will be able to associate physics concepts with real world and understand the application of the physics laws they learn in lectures.

Learning Outcomes:

- Students will be able to analyze one-, two-, and three-dimensional linear and rotational motions of objects by using kinematic equations.
- Students will be able to describe and analyze motions by using pictorial, tabular, graphical, and mathematical representations on an object's position, velocity, acceleration, and mechanical energy.
- Students will be able to apply Newton's three laws and free-body diagram to analyze the net external force on an object and the resulting motion.
- Students will be able to apply conservation laws in Physics to simply analysis of motions.
- Students will be able to associate mechanical laws with nature phenomena, such as various linear and rotational motions, spring motion, mechanical energy conservation or dissipation, and simple harmonic motion.
- Students will be able to write a formal scientific report, which will benefit their future careers.

Course Policies & Safety Issues

Laboratory Behavior

Both the instructor and the students are to adhere to high standards of professionalism, common courtesy, and respect for others. Please refrain from the following behaviors, bearing in mind that if your behavior interrupts the class you may be asked to leave the class for the rest of the period:

- Coming to lab session late is not tolerable (no later than 5 minutes after a session starts).
- Using cell phones in class. Please turn off your phone before class.
- Disruptive behavior. This includes talking to others, reading newspapers, etc. Please be ready to attend to the subject of the class; if you are not motivated to learn please do not come and distract those who are motivated.
- Talking out of turn during laboratory instruction period. This can be rude and disruptive. However, I am very interested in what you have to say and will be happy to entertain questions and comments if you wait your turn.
- Speaking to anyone in a rude or aggressive fashion or speaking of others in a disrespectful fashion.

University Policies

www.fresnostate.edu/catalog/

Students with Disabilities

Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in University Center Room 5 (278-2811).

Honor Code

"Members of the CSU Fresno academic community adhere to principles of academic integrity and mutual respect while engaged in university work and related activities." You should:

- (a) understand or seek clarification about expectations for academic integrity in this course (including no cheating, plagiarism and inappropriate collaboration),
- (b) neither give nor receive unauthorized aid on examinations or other course work that is used by the instructor as the basis of grading,
- (c) take responsibility to monitor academic dishonesty in any form and to report it to the instructor or other appropriate official for action.

Instructors may require students to sign a statement at the end of all exams and assignments that "I have done my own work and have neither given nor received unauthorized assistance on this work." If you are going to use this statement, include it here.

Cheating and Plagiarism

"Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term 'cheating' not be limited to examination situations only, but that it includes any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work." Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the university. For more information on the University's policy regarding cheating and plagiarism, refer to the Class Schedule (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations).

Computers

"At California State University, Fresno, computers and communications links to remote resources are recognized as being integral to the education and research experience. Every student is required to have his/her own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. The minimum and recommended standards for the workstations and software, which may vary by academic major, are updated periodically and are available from Information Technology Services (<http://www.csufresno.edu/ITS/>) or the University Bookstore. In the curriculum and class assignments, students are presumed to have 24-hour access to a computer workstation and the necessary communication links to the University's information resources."

Disruptive Classroom Behavior

"The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goals of academic freedom are maintained. ... Differences of viewpoint or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop and understanding of the community in which they live . . . Student conduct, which disrupts the learning process, shall not be tolerated and may lead to disciplinary action and/or removal from class."

Copyright policy

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<http://www.csufresno.edu/library/libraryinformation/campus/copyright/copyrtpolicyfull.pdf>

For copyright Questions & Answers:

<http://www.csufresno.edu/library/libraryinformation/campus/copyright/faqcopyright.pdf>

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Lab Schedule for Spring 2026

Week	Wednesday	Topic of the lab
1	January 14	NO LAB: Beginning of Semester
2	January 21	NO LAB
3	January 28	Lab Introduction
4	February 4	Lab 1: Statistics I, Clock timing
5	February 11	Lab 2: Statistics II, Data-Driven Decision Making
6	February 18	NO LAB: Presidents Day holiday
7	February 25	Lab 3: Introduction to 1-Dimensional Motion
8	March 4	Lab 4: Vector Addition
9	March 11	Lab 5: Projectiles
10	March 18	Lab 6: Newton's Second Law
11	March 25	Lab 7: Energy and Power
-	April 1	NO LAB: Spring Break
12	April 8	Lab 8: Conservation of Linear Momentum
13	April 15	Lab 9: Forces and Torques in Equilibrium
14	April 22	Lab 10: Torque, Angular Acceleration, and Moment of Inertia
15	April 29	Lab 11: Simple Harmonic Motion
16	May 6	NO LAB: End of Semester

(1) Prior to the lab session

You are required to read and understand the pertinent section(s) in the lab manual before you come to the lab. Seek help from your instructor or the Department of Physics tutors if you have questions about the lab or the lecture. You are expected to have read and understood the section on Laboratory Policy as well as the appropriate sections in the University Catalog.

(2) Finish your lab reports and hand them in before you leave

- (a) This is advantageous from your point of view in that you will not have to spend a lot of time preparing a cosmetically attractive, extensive lab report. However, you should put in more time in preparation so that you can finish comfortably in 2 hours and 50 minutes.
- (b) Check any procedure you are unsure of with the lab instructor. You will have to repeat procedures that are incorrect.
- (c) All partners must write up their own reports: having your personal report will help studying for subsequent quizzes.

(3) Lab Reports

- (a) See the first few pages of the laboratory packet for suggestions about report organization!
- (b) You do not need to prepare your own cover page. A cover page will be provided to you at each lab.
- (c) You do not have to reproduce theory which is presented in the lab manual. Derivations are not necessary unless explicitly required.
- (d) Your data sheet must include all data with appropriate units.
- (e) When doing repetitive calculations, only one needs to be shown explicitly.
- (f) Answer all questions and solve all problems.
- (g) Try to estimate uncertainties and calculate errors when called for. If your calculator will perform linear regressions, read your instruction manual so that you can do them.

(4) Graphing

- (a) When graphing F vs. C, F is plotted on the y-axis and C on the x-axis.
- (b) Estimate the range of the variables you're plotting before you start so that you end up with reasonably scaled axes.
- (c) Label both axes, specify the units, and title your graph.
- (d) Do all graphing requested on engineering paper (or better). If available, use the laboratory computer for plotting data.

(5) Significant Figures

Generally, you will be able to use three significant figures legitimately - sometimes only two.

(6) Dominant Lab Partner

If you have a skilled partner, an electrician for example, do not let this partner go too fast and assemble the circuit before you understand what is happening. Slow the skilled person down and ask for explanations!