Physics 4A, Section 61 & 62
Physics for Scientists and Engineers: Mechanics
De Anza College, Fall 2019

Instructor: Chien-I Chiang **Email: chiangchien-i@fhda.edu**

Office hours: M/W 05:00 – 05:25pm @ S13
Thu 9:10 – 10:00pm through email
Class Meeting: M/W 5:30am – 7:45pm @**FOR4**
M(Sec.61)/W(Sec.62) 7:55 – 10:45am @**S11**
Credit: 6 units

***Be sure to check the announcement and resources on Canvas frequently**

Course Objective

Welcome to PHYS-4A! This course covers **kinematics, Newtonian mechanics, conservation laws, rotational dynamics, and oscillation.**

The aim of this course is to help you build a solid conceptual understanding of the subject matter and the capability to describe and analyze physical systems quantitatively. As you may have encountered most of the physical systems that we will cover in this class in daily life, the study of mechanics gives you the opportunity to learn how to combine physical intuitions with mathematical descriptions, through **derivations** of important equations and problem-solving. This paves the road for future careers in physical sciences and engineering.

Textbook

The required textbook is ***Physics for Scientists and Engineers with Modern Physics***, by **Serway**. Any edition is fine. I'll also post my own lecture notes to Canvas.

Homework/Quizzes

Weekly problem sets will be given every week in the form of pdf posted on Canvas. The homework assignments will not be collected. **However, it is your responsibility to ensure that you finish the problems before the expected time frame.**

To prompt you to finish the problems on time, **five quizzes** will be given throughout the quarter. The quizzes will be based on the problems in the HW assignments. No makeup quizzes are allowed, but **lowest quizzes will be dropped.**

Lab

The attendance to weekly lab sections are required. A one-third of letter grade will be deducted (e.g. A- to B+) for *each* unexcused lab. You do not need to purchase any lab manual or workbook. **The pdf files for the labs will be posted on Canvas before the lab.** The *tentative* dates for the labs can be found in the tentative schedule appended to the syllabus. The only time period for making up a lab is in the thanksgiving week.

The aims of the labs are to help you understand the physical concepts covered in class, as well as learning the basic skills of analyzing data and **presenting your results concisely.** A sample of lab write-up can be found in Canvas.

Labs are done in a group of three or two people. You need to actively participate the labs in order to receive full credit. A sample of lab report is posted on Canvas. Lab reports are to be done in an 8.5”x 11” notebook and according to the format of the sample lab report. Only write on one side of a page and start a new lab report at the top of a page. Write the names of your lab partners at the top right-hand corner of the lab report. The lab reports are due at the end of class. **You are required to have me check your lab report before you leave. You will turn in the lab notebooks at the end of class, you do not take them home.** (But you can take it back at the end of the semester)

Exams

There will be **two midterm exams** and **one cumulative final exam**. The tentative dates for the two midterms are:

MT1: Wednesday, 10/16, in class
MT2: Wednesday, 11/6, in class
Final: Monday, 12/9, 5:40pm-8:40pm

Calculators, nor any other electronic devices, are not allowed to the exams. You won’t need them as the exams will have few, if any, numerical problems. A list of very basic mathematical formulas will be given with the exams. However, **physical equations will not be provided. You are required to remember all the important equations you need.** You are NOT allowed to bring your own personal notes to the exam. This is not to encourage you to memorize equations. Instead, the aim is encouraging you to internalize them by **repeating derivations** and solving problems.

Due to logistic difficulties, **no make-up exams will be given for any reason.** If you cannot take the exams due to medical conditions or other extenuating circumstances, official documents are required to make *possible* accommodations. You must take the final exam to pass the course.

You need to show your work on all exams. Correct answers without supporting work will not receive credit. Full credit will only be given when you explicitly show the logical steps in a clear manner. Please make sure your handwriting is recognizable to help the grading process.

Study Guide

1. Studying physics takes a lot of time. Although this varies person by person, if the goal is to get an A for this class, at least 8hrs/week outside the class meetings is most likely needed.
2. **Understanding derivations of important formulas and being able to reproduce them is vital** for understanding the physics. In the exams, I will ask you to derive equations.
3. I do not encourage memorizing formulas. However, if you find yourself frequently referring to formula sheets, that's usually a sign of not being familiar with the material enough.
4. Do not randomly search for equations and manipulate them. Understand the context of a given equation; know when you can and cannot use an equation.
5. Imitation is an important process for learning physics. Study the example problems carefully and try to mimic the way of solving problems.
6. Do not leave things behind. Make sure you understand the example and exercise problems given in the lecture. If you don't understand anything I said, **please do not hesitate to ask!**

Grade

The course grade is based on your scores in homework assignments, labs, worksheets and exams, with the following weighting:

Quizzes 8%
Labs 12%
MT1 23%
MT2 23%
Final 23%
Highest Exam 11%

The course grade will be translated to a letter grade with the following table:

Course Grade	Letter Grade	GPA
Outstanding	A+	4.0
$\geqq 89\%$	A	4.0
$86\% \leqq x < 89\%$	A-	3.7
$80\% \leqq x < 86\%$	B+	3.3
$75\% \leqq x < 80\%$	B	3.0
$70\% \leqq x < 75\%$	B-	2.7
$65\% \leqq x < 70\%$	C+	2.3

60% ≦ x < 65%	C	2.0
55% ≦ x < 60%	C-	1.7
50% ≦ x < 55%	D	1.0
x < 50%	F	0.0

* ***This grading scale—at my sole discretion—may be shifted downward if needed***.

**** You must take the final exam to pass the course.***

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Tentative Schedule

Date	Wk	Day	Lecture/Exercise Topics	Lab
9/23	1	M	Dimensional Analysis and Units, Vectors, Displacement and Distance	Lab Introduction & Error Propagation
9/25		W	Kinematics: General Aspects	
9/30	2	M	Problems in 1D Kinematics	Lab 1 Measurement and Error Analysis
10/2		W	Problems in 2D Kinematics	
10/7	3	M	Force and Motion I: Normal Force, Tension, Friction	Lab 2 Behr Free Fall
10/9		W	Force and Motion II: Gravity, Spring	
10/14	4	M	Review for MT1	Lab 2 Behr Free Fall (continue)
10/16		W	**Midterm 1**	
10/21	5	M	Work, Kinetic Energy, and Potential Energy	Lab 3 Newton 2nd Law
10/23		W	Problems with Conservation of Energy	
10/28	6	M	Linear Momentum	Lab 4 Newton's 2nd Law on an Incline Plane
10/30		W	Conservation of Linear Momentum and Collision Problems	
11/4	7	M	Review for MT2	Lab 5 Centripetal Acceleration
11/6		W	**Midterm 2**	
11/11	8	M	***Veterans Day holiday***	
11/13		W	Center of Mass, System of Many Particles	Lab 6 Static Equilibrium
11/18	9	M	Rotational Kinematics, Rigid Body, Rotational Kinetic Energy, Moment of Inertia and Torque	
11/20		W	Calculation of Moment of Inertia	Lab 7 Moment of Inertia
11/25	10	M	Problems in Rotational Dynamics and Conservation of Angular Momentum	
11/27		W	Rolling Motion	***Make-up Lab***
12/2	11	M	Oscillation	Lab 8 Simple Harmonic Motion
12/4		W	Review for Final Exam	
12/9	12	M	**Final Exam**	
12/11		W		

* The schedule is tentative, and it may be changed according to the pace of the class.

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Student Learning Outcome(s):

*Critically examine new, previously un-encountered problems, analyzing and evaluating their constituent parts, to construct and explain a logical solution utilizing, and based upon, the fundamental laws of mechanics.

*Gain confidence in taking precise and accurate scientific measurements, with their uncertainties, and then with calculations from them, analyze their meaning as relative, in an experimental context, to the verification and support of physics theories.