



Department of Physics and Engineering, Point Loma Nazarene University

PHY 2044 University Physics I (3 Units, 3 contact hours)

PHY 2044L University Physics I Lab (1 Unit, 2 contact hours)

Instructor (Fall 2023): Michelle Chen

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Office Hours: Mon. 11:45 am – 1:15 pm; Tue. 11:45 am – 12:15 pm; Wed. 11:00 am – 11:45 am; Thu. 11:00 am – 12:00 pm; Fri 8:30 am – 9:00 am; and by appointment

Lecture: MWF 7:25 am – 8:20 am, Rohr Science 265

Final Exam: 7:30 am – 10:00 pm, Monday December 11, 2023

Lab: Section 1: T 7:25 – 9:10 am, Rohr Science 265, TA Sabrina McCraley

Section 2: T 10:00 – 11:45 am, Rohr Science 265, TA Sabrina McCraley

Textbooks or Other Required Materials: Physics for Scientists and Engineers, 4th Edition by Giancoli, Access to Expert TA, and a calculator

Catalog Description: An analytic, calculus-based study of classical physics appropriate for science and engineering majors. Includes mechanics, waves, and thermodynamics.

Co-requisite: PHY 2044L and MTH 1064 or MTH 1044 or consent of instructor.

Role in Program: Required

Course Learning Objectives/Outcomes: For Foundational Exploration Mission, PLNU provides a foundational course of study in the liberal arts informed by the life, death, and resurrection of Jesus Christ. In keeping with the Wesleyan tradition, the curriculum equips students with a broad range of knowledge and skills within and across disciplines to enrich major study, lifelong learning, and vocational service as Christ-like participants in the world's diverse societies and cultures.

This course is one of the components of the General Education Program at Point Loma Nazarene University, in support of the general education learning outcome: Quantitative Reasoning: Students will be able to solve problems that are quantitative in nature. The purpose of general education is to provide a common educational experience, to develop essential skills, and to provide a broad cultural background for personal and professional growth. Within these broader outcomes, in this course you will:

1. translate the description of physics problems into the mathematical equations required to solve them using relevant physical principles
2. calculate solutions to physics problems once appropriate equations or techniques are

identified

3. predict reasonable answers in appropriate problems, and assess the reasonableness of calculated answers
4. explain the physical meaning of the parameters in introductory physics equations
5. create and interpret graphical representations of physical quantities
6. gather and interpret data in a lab setting

Student Outcomes Addressed:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (LO1)

Topics:

1. Introduction, measurement and estimating
2. Kinematics in one, two or three dimensions, vectors
3. Using Newton's Laws of Motion
4. Work and energy, conservation of energy
5. Linear momentum, rotational motion, and angular momentum; general rotation
6. Static equilibrium
7. Fluids
8. Oscillations
9. Wave motion
10. Sound

ASSESSMENT AND GRADING

Graded Components

- **Pre-Class:** In preparation for each class meeting there is a reading assignment. To be ready for group work and higher-level learning, these reading assignments are very important to help you come prepared to class. To complete the reading assignment, you must answer a few questions and submit them electronically through Canvas by 7:00 am of the morning before class. Late submissions will not be accepted. This electronic communication is so important because it is your voice in what material we emphasize during class meetings and provides me constant feedback of your understanding of the material. These submissions will be graded on the following scale: 2 = demonstrates reading, 1 = room for improvement, 0 = unsatisfactory. These points are accumulated and are worth 5% of the final grade. The lowest 4 scores will be dropped.
- **Homework:** Practicing working physics problems is critical to your success in the class. Almost each week there will be homework assignment posted on CANVAS and due through ExpertTA. You are strongly encouraged to discuss with your classmates, but to solve and submit your own work. Late homework receives a 20% reduction in possible value per day.

- **Lab:** Weekly lab meetings will provide you the opportunity for hands-on experience of topics from class meetings, improve lab technique, and data analysis. Labs will be performed in small groups, but each individual is responsible for submitting their own results. It is essential to not miss a lab, since it would be very tricky to make up a lab without labmates. You must pass the lab portion of the class to pass the class.
- **Examinations and Final Examination:** There will be three in-class exams during the semester and one comprehensive final exam. All exam dates are indicated in the course calendar in the syllabus. Exams will be closed book, but a sheet of formulas will be provided to you to use during your exam. Partial credit will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for me to understand. For problems that call for solution or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown. Exams are to be taken at the time indicated in the syllabus unless other arrangements are made in advance with the professor for some unavoidable circumstance, and otherwise cannot be made up. You must take ALL the exams in order to pass the class. **Final Examination Policy:** Successful completion of this class requires taking the final examination **on its scheduled day (Monday December 11th, 2023, 7:30 am – 10:00 am).**

Grading Scale

- Your course grade will be based on the following:

• Component	• Weight
• Pre-Class	• 5%
• Homework	• 20%
• Lab	• 20%
• Tests (3)	• 35% (equally weighted)
• Final Exam	• 20%

- **Grading Scale:** The letter grade you will earn in this course is based on the following:

Standard Grade Scale Based on Percentages

A	B	C	D	F
A $S \geq 92$	B+ $90 > S \geq 88$	C+ $80 > S \geq 78$	D+ $70 > S \geq 68$	$S < 60$
A- $92 > S \geq 90$	B $88 > S \geq 82$	C $78 > S \geq 72$	D $68 > S \geq 62$	
	B- $82 > S \geq 80$	C- $72 > S \geq 70$	D- $62 > S \geq 60$	

FINAL EXAM

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the [Class Schedules](#) site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

CREDIT HOUR

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 4 unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 150 total hours meeting the course learning outcomes. The time estimations are provided in the Canvas modules.

PLNU MISSION

To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

DEPARTMENT MISSION

The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any

change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation.

CLASS ENROLLMENT

It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow

through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

SPIRITUAL CARE

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#).

Tentative Calendar (subject to updates)

Date	Topic	Reading	Lab (Tuesdays)
M 08/28/23	Introduction		
W 08/30/23	Measurement, Estimating	1.1-1.7	
F 09/01/23	Reference Frame, Displacement, Ave./Inst. Velocity, Acceleration	2.1 - 2.4	
M 09/04/23	No Class: Labor Day		
W 09/06/23	Motion at Constant Acceleration	2.5 - 2.6	Lab 1: Measurements & Uncertainty
F 09/08/23	Freely Falling Objects	2.7 - 2.7	
M 09/11/23	Vectors and Scalars	3.1 - 3.5	
W 09/13/23	Vector Kinematics, Projectile Motion	3.6 - 3.8	Lab 2: Motion
F 09/15/23	Force, Newton's First, Second, and Third Law	4.1 - 4.5	
M 09/18/23	Mass, Weight, Normal Force, Free-Body Diagram, Problem Solving	4.6 - 4.8	
W 09/20/23	Friction, Application of Newton's Laws	5.1 - 5.1	Lab 3: Forces
F 09/22/23	Uniform Circular Motion; Banked and Unbanked Curve	5.2 - 5.4	
M 09/25/23	Catchup		
W 09/27/23	Exam 1		Lab 4: Frictional Forces
F 09/29/23	Newton's Law of Universal Gravitation; Satellite and Weightlessness	6.1 - 6.4	
M 10/02/23	Kepler's Laws	6.5 - 6.5	
W 10/04/23	Work Done by Constant and Varying Forces	7.1 - 7.3	Lab 5: Air Resistance
F 10/06/23	Kinetic Energy and Work-Energy Principle	7.4 - 7.4	
M 10/09/23	(Non)-Conservative Forces; Mechanical Energy Conservation	8.1 - 8.5	
W 10/11/23	Conservation of Energy; Escape Velocity; Power	8.5 - 8.8	Lab 6: Conservation of Energy
F 10/13/23	Momentum Conservation; Collision and Impulse	9.1 - 9.3	
M 10/16/23	Elastic and Inelastic Collisions	9.4 - 9.7	
W 10/18/23	Catchup		Lab 7: Conservation of Momentum
F 10/20/23	No Class: Fall Break		
M 10/23/23	Center of Mass; Angular Quantities, Constant Angular Acceleration	9.8; 10.1 - 10.3	
W 10/25/23	Exam 2		No Lab
F 10/27/23	Torque; Rotational Dynamics; Moment of Inertia	10.4 - 10.7	
M 10/30/23	Rotational Kinetic Energy, Rolling Motion	10.8 - 10.9	
W 11/01/23	Angular Momentum and Its Conservation	11.1 - 11.3, 11.6	Lab 8: Rolling Motion
F 11/03/23	Equilibrium, Stability and Balance	12.1 - 12.3	
M 11/06/23	Simple Harmonic Motion	14.1 - 14.4	
W 11/08/23	Simple Harmonic Motion, Simple Pendulum	14.5, 14.6	Lab 9: Ruler Equilibrium
F 11/10/23	Damped and Forced Harmonic Motion, Resonance, Waves	14.7-8, 15.1 - 15.2	
M 11/13/23	Waves	15.3 - 15.4	
W 11/15/23	Superposition, Reflection, Transmission, Interference, Standing Wave	15.5 - 15.9	Lab 10: Simple Harmonic Motion
F 11/17/23	Catch Up		
M 11/20/23	Exam 3		
W 11/22/23	No Class: Thanksgiving		No Lab
F 11/24/23	No Class: Thanksgiving		
M 11/27/23	Decibels, Sound in vibrating String and Air Columns	16.1 - 16.5	
W 11/29/23	Beats, Doppler Effect, Shock Waves and Sonic Boom	16.6 - 16.8	Lab 11: Musical Straws
F 12/01/23	Fluids	Chapter 13	
M 12/04/23	Fluids	Chapter 13	
W 12/06/23	Ideal Gas	Chapter 17	Lab 12: Fluids
F 12/08/23	Catch Up		
M 12/11/23	Final Exam (7:30 am - 10:00 am)		
W 12/13/23			
F 12/15/23			