

# Physics I with Laboratory

PHYS 104/114 • Spring 2026

Centenary College of Louisiana

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<b>Instructor</b>	Dr. David Kordahl	<b>Email</b>	<a href="mailto:dkordahl@centenary.edu">dkordahl@centenary.edu</a>
<b>Office</b>	Centenary Square 203B	<b>Lecture</b>	MWF 11:00–11:50 am, Mickle Hall 114
<b>Office Hours</b>	M 1:00–3:00 pm T 11:00 am–2:00 pm W 12:00–2:00 pm	<b>Lab</b>	PHYS 114, scheduled lab sections

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## Course at a Glance

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<b>Lecture Course</b>	PHYS 104: Physics I
<b>Laboratory Course</b>	PHYS 114: Physics I Laboratory
<b>Lecture Text</b>	Halliday, Resnick, Walker, <i>Fundamentals of Physics</i> , 12th ed.
<b>Homework Platform</b>	WileyPLUS
<b>Prerequisite/Corequisite</b>	MATH 115, Calculus I; PHYS 104 and PHYS 114 are corequisites

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## Course Description

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Physics I introduces the basic elements of forces and motion. The course follows the standard first-semester path through introductory mechanics: measurement, one-dimensional and multidimensional motion, vectors, Newton's laws, work and energy, momentum, rotation, torque, gravitation, and oscillations. Throughout the course, students learn to use mathematical models to solve classic problems involving projectiles, forces, collisions, rotating bodies, orbits, and springs.

The accompanying laboratory is closely aligned with the lecture course. Each lab gives students an opportunity to explore ideas from lecture in an applied setting through measurement, graphing, data analysis, and physical interpretation. Some laboratory activities conclude with formal lab reports, while others conclude with lab packets involving questions and quantitative analysis.

Together, the lecture and lab emphasize physics as a practice of modeling: identifying relevant quantities, representing relationships mathematically, testing those relationships against data, and interpreting the results physically.

## Learning Goals

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By the end of PHYS 104/114, students should be able to:

- distinguish between basic measurable quantities and describe the roles of accuracy and precision;
- use position, velocity, and acceleration to describe one-dimensional motion;
- use vectors to describe forces and motion in two and three dimensions;
- apply Newton's laws to connect force, mass, and acceleration;
- use work, kinetic energy, potential energy, and conservation of energy to analyze motion;

- use impulse, momentum, angular momentum, and conservation laws to analyze collisions and rotational motion;
- apply Newton's law of universal gravitation to orbital and astronomical motion;
- describe simple harmonic motion, resonance, standing waves, and related oscillatory phenomena;
- collect, graph, and interpret experimental data;
- compare experimental measurements with mathematical models and communicate results clearly.

### Relationship Between Lecture and Lab

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The lecture course develops the mathematical models used in introductory mechanics. The laboratory course asks students to investigate those models experimentally, using measurements and data analysis to connect physical concepts with observed behavior.

The lab sequence mirrors the lecture sequence as closely as possible. Early labs emphasize graphing, one-dimensional motion, vectors, and projectile motion; later labs address Newton's laws, energy, momentum, torque, gravitation, and oscillations.

### Assessment

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#### PHYS 104: Physics I

The lecture grade emphasizes examinations, homework practice, attendance questions, and weekly reflection questions.

Component	Weight
Tests and Final Exam	68%
Homework	22%
Attendance Questions	5%
Reflection Questions	5%

Problem sets, if completed in good faith, should result in substantial progress in learning the material, which should in turn be reflected in exam performance. The homework average may therefore be adjusted downward if the disparity between homework performance and demonstrated learning on exams is too large. In particular, the homework grade can be no more than 20 percentage points higher than the hour-exam average, excluding the final exam.

#### PHYS 114: Physics I Laboratory

The laboratory grade is points-based. A typical lab is worth 25 points and has one graded assignment. The final week of lab includes a lab exam, which carries the credit of one lab.

## Letter Grades

Grade	Percentage Range
A	90–100%
B	80–89%
C	70–79%
D	60–69%
F	below 60%

## Detailed Lecture Schedule

This schedule records the specific lecture topics and approximate textbook coverage. The pacing may be adjusted as needed, but the table reflects the intended structure of the course.

Dates	Reading	Lecture Topics
Jan. 12	Ch. 1	Measurement
Jan. 14, 16, 21	Ch. 2	One-dimensional motion
Jan. 23, 26	Ch. 3	Vectors
Jan. 28, 30; Feb. 2	Ch. 4	Two- and three-dimensional motion
Feb. 4, 6	Review	Unit 1 review
Feb. 9		Exam 1
Feb. 11, 13, 23	Ch. 5	Force and motion I
Feb. 25, 27	Ch. 6	Force and motion II
Mar. 2, 4	Ch. 7	Work and kinetic energy
Mar. 6, 9	Ch. 8	Conservation of energy
Mar. 11	Review	Unit 2 review
Mar. 13		Exam 2
Mar. 16, 18, 20	Ch. 9	Momentum
Mar. 23, 25, 27	Ch. 10	Rotation
Mar. 30; Apr. 1	Ch. 11	Torque and angular momentum
Apr. 8, 10, 13	Ch. 13	Gravitation
Apr. 15	Review	Unit 3 review
Apr. 17		Exam 3
Apr. 20, 22, 24	Ch. 15	Oscillations
Apr. 27, 29; May 1	Review	Preparation week
May 5		Final Exam, 12:00–3:00 pm

## Detailed Laboratory Schedule

The laboratory sequence closely mirrors the sequence of topics in PHYS 104. Each activity is designed to reinforce concepts introduced in lecture while developing experimental and data-analysis skills.

Lab	Date(s)	Learning Outcome
Graphing	Jan. 14–15	Understanding how to tease basic functional relationships out of data
One-dimensional motion	Jan. 21–22	Understanding motion under constant velocity and constant acceleration
Forces and vectors	Jan. 28–29	Understanding how forces can add like vectors to achieve equilibrium
Two-dimensional motion	Feb. 4–5	Understanding how the types of one-dimensional motion can be combined for projectiles
Newton's second law	Feb. 11–12	Understanding how models of force can be introduced to capture physical phenomena
Work and energy	Feb. 25–26	Understanding how work performed on a system can change its kinetic energy
Energy conservation	Mar. 4–5	Understanding how potential and kinetic energy, once summed, remain constant
Impulse and momentum	Mar. 11–12	Understanding the impulse-momentum theorem and momentum conservation
Torque	Mar. 18–19	Understanding how both force and torque sum to zero at static equilibrium
Gravitation and orbits	Apr. 1–2	Understanding how gravitational effects lead to familiar astronomical phenomena
Oscillations	Apr. 15–16	Understanding how Hooke's law describes the dynamics of a mass bouncing on a spring
Lab final	Apr. 29–30	Cumulative laboratory assessment

### Laboratory Writing

Some laboratory activities are assessed through formal lab reports, while others are assessed through completed lab packets involving questions and data analysis. Formal reports follow a standard scientific structure: title, objective, introduction, materials, procedure, data, discussion, and conclusion. The purpose of this format is to help students connect experimental procedure, quantitative evidence, uncertainty, and physical interpretation.

## Course Policies

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### Academic Honesty and the Honor Code

Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. All students at Centenary are bound by the Honor Code. It is not considered cheating in this course to share suggestions on assignments or lab submissions with peers, although the final work must ultimately be one's own unless specified otherwise. Discussion questions may be researched online, but artificial intelligence may not be used in writing the answer.

Students are required to write the following pledge at the end of any examination or assignment:

*I have neither given nor received unauthorized aid on this examination (paper), nor have I seen anyone else do so.*

If any student has received aid or suspects others of violating the Honor Code, the following clause is to be added to the pledge: "...except as I shall report immediately to the Honor Court." The complete pledge must be written and signed by the student, shall not be abbreviated, and should never be written until the test or paper has been completed for submission. Students are bound by the Honor Code even if they fail to write the pledge on their assignment or examination.

### Attendance

Attendance is required. However, students are expected not to jeopardize their own health or anyone else's health to attend class. Illness-related absences will be excused. There is no penalty for missing class if students proactively communicate with the professor and complete all required work. If a qualified professional deems remaining in classes and fulfilling the necessary requirements impossible, alternatives will be sought in coordination with Student Support Services.

For PHYS 104, more than nine unexcused absences will lead to a failing grade in the course.

### Disability Accommodations

It is the policy of Centenary College to accommodate students with disabilities, pursuant to federal law, state law, and the College's commitment to equal educational opportunities. Any student with a disability who needs accommodations should inform the instructor at the beginning of the course. Students with disabilities need to contact Disability Services, a division of the Center for Teaching and Learning, located in the Learning Commons on the second floor of Magale Library. Disability Services can be reached by telephone at 318-869-5738 or by email at [disability@centenary.edu](mailto:disability@centenary.edu).

### Diversity Statement

Centenary College of Louisiana values human diversity in all its richly complex and multi-faceted forms, whether expressed through race and ethnicity, culture, political and social views, religious and spiritual beliefs, language and geographic characteristics, gender, gender identities and sexual orientations, learning and physical abilities, age, and social or economic classes.