General Physics I Lab

Course Materials

Custom Lab Kit from eScienceLabs.com (please use the "find my kit" button) which is $173; please enter this code [Kit2251] to ensure that you purchase the correct Lab.

Course Description

This lab-only course is designed as a standalone addition to the General Physics I course. Students will complete at-home laboratory experiments, track and record results, answer lab-based questions reflected in graded lab reports, and complete lab-based assessments to meet the lab requirement. The labs are provided by eScience Labs, a leading provider of at home lab kits and online lab instructional materials and resources.

Course Prerequisites

It is suggested, but not required, that students complete an equivalent to General Calculus I (MAT250) prior to enrolling in this course. Concurrent enrollment in the General Physics I course (PHY250) is strongly encouraged.

Course Objectives

After completing this course, students will be able to:

- Discuss uncertainty in measurement and significant digits
- Solve problems involving linear, projectile, and circular motion
- Explain Newton's laws and how they apply to free body diagrams
- Discuss the difference between static and kinetic friction
- Compare and contrast types of energy
- Describe how momentum is conserved in elastic collisions
- Apply Archimedes' by measuring buoyant force and displaced water weight
- Differentiate between specific and latent heat
- Distinguish between work done by systems and work done on systems

Course Prerequisites

There are no prerequisites for this course.

Important Terms

In this course, different terms are used to designate tasks:

- **Tutoring**: memberships include online tutoring for students to access with any content/subject related questions in the place of faculty. If your tutor is not able to answer your questions please contact a student advisor.
- **Lab Worksheets**: These are experiments that you will complete at home and be assessed on through online exercises.
- **Lab Exam**: A graded online test.

Important Note: All lab uploads must represent your own individual work. Even if you are working in a group with other students, each individual student must submit independent work. If you submit identical submissions or share submissions with another student, you will earn a zero for the assignment and will not earn credit for the course.

Academic Integrity Statement

Academic integrity is the pursuit of scholarly activity in an honest, truthful and responsible manner. Violations of academic integrity include, but are not limited to, plagiarism, cheating, fabrication and academic misconduct. Failure to comply with the Academic Integrity Policy can result in a failure and/or zero on the attempted assignment/examination, a removal from the course, disqualification to enroll in future courses, and/or revocation of an academic transcript.

Course Completion Policy

In order for a course to be considered complete, all required coursework must be attempted, submitted, and graded. Required coursework consists of graded assignments. Any Academic Integrity Policy violations may prevent a course from being considered complete.

Course Evaluation Criteria

Your score provides a percentage score and letter grade for each course. A passing percentage is **70%** or higher.

There are a total of 1000 points in the course:

Topic	Assessment	Points Available
Introduction	Upload: Lab Kit Photos	5
1	Lab Exam 1	10
1	Lab 1 Worksheet: Measurements and Uncertainty	60
2	Lab Exam 2	10
2	Lab 2 Worksheet: Kinematics	250
3	Lab Exam 3	10
3	Lab 3 Worksheet: Newton's Laws	120
4	Lab Exam 4	10
4	Lab 4 Worksheet: Friction	50
5	Lab Exam 5	10
5	Lab 5 Worksheet: Circular Motion	80

Topic	Assessment	Points Available
6	Lab Exam 6	10
6	Lab 6 Worksheet: Conservation of Energy	80
7	Lab Exam 7	10
7	Lab 7 Worksheet: Conservation of Momentum	50
8	Lab Exam 8	10
8	Lab 8 Worksheet: Buoyant Force and Archimedes Principle	80
9	Lab Exam 9	10
9	Lab 9 Worksheet: Ideal Gas Law	50
10	Lab Exam 10	10
10	Lab 10 Worksheet: Thermodynamics	75
Total		1000

Course Topics and Objectives

Lab	Title	Objectives
1	Measurements and Uncertainty	• Demonstrate the use of a Vernier scale and explain different reasons for error when reading scales • Determine the uncertainty for a ruler, caliper, spring force scale, and stopwatch • Determine the density of the material of the mass set • Explain the reasons for error in calculations
2	Kinematics	• Distinguish between scalar and vector quantities • Use kinematic equations to describe 1-D motion • Interpret 1-D motion graphs • Graph position, velocity, and acceleration vs. time • Calculate average and instantaneous velocity or acceleration • Relate vectors to projectile motion • Determine the independent x and y components of a vector • Use 1-D kinematics to describe projectile motion • Determine which launch angle results in the greatest projectile range
3	Newton’s Laws	• Formulate the law of inertia • Relate force and acceleration • Describe forces as action-reaction pairs • Draw and explain free body diagrams
4	Friction	• Explain the difference between static and kinetic friction • Determine the dependence of the force of friction on the normal force

Lab	Title	Objectives
		• Describe how the force of friction acts on objects on an incline
5	Circular Motion	• Use Newton's Laws of Motion to describe the forces on an object in uniform circular motion • Relate velocity, radius, and time period to uniform circular motion • Explain the direction of acceleration during uniform circular motion • Use Newton's Law of Gravity to explain the motion of objects in orbit • Compare the rates at which objects fall toward Earth • Explain the relationship between the force of gravity and distance between two objects • Determine the value of the gravitational constant "G"
6	Conservation of Energy	• Relate energy to work • Determine the amount of work done by a force • Compare and contrast types of energy • Use the Law of Conservation of Energy to solve for potential and kinetic energy
7	Conservation of Momentum	• Use conservation of momentum to describe elastic collisions • Explain how the rate of change of momentum is related to force and time • Interpret graphs for elastic, inelastic, and completely inelastic collisions and "explosions"
8	Buoyant Force and Archimedes Principle	• Predict the behavior of fluids based on their viscosity and density • Explain why objects sink or float • Measure buoyant force in terms of the weight of water displaced • Apply Archimedes' Principle to calculate the density of a material
9	Ideal Gas Law	• Determine the relationship between pressure and volume • Determine the relationship between pressure and temperature • Explain the value of absolute zero
10	Thermodynamics	• Use the First Law of Thermodynamics to confirm the Law of Conservation of Energy • Distinguish between work done by systems and work done on systems • Identify the different processes of heat transfer including conduction, convection, and radiation

Lab	Title	Objectives
		• Explain why the disorder of an isolated system must increase • Mathematically describe the entropy of states for a simple system • Determine the statistical probability of states

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