

Course Description

PHY2048L | Physics with Calculus Lab 1 | 1.00 credit

This laboratory course complements PHY2048 by providing hands-on experience in the principles of kinematics, dynamics, energy, momentum, rotational motion, fluid dynamics, oscillatory motion, and waves. Students will engage in practical experiments that reinforce theoretical concepts covered in the parent course, allowing them to apply analytical problem-solving techniques to real-world scenarios. Through a series of structured laboratory activities, students will develop critical thinking and analytical skills while collecting and analyzing data related to motion and forces. This course is designed for science and engineering majors, preparing them for advanced studies and professional applications in physics and related fields.

Course Competencies:

Competency 1: The student will demonstrate proficiency in experimental techniques by:

1. Setting up and calibrating laboratory equipment for experiments
2. Conducting experiments to investigate principles of kinematics and dynamics
3. Measuring physical quantities accurately using appropriate tools
4. Recording data systematically during laboratory sessions
5. Implementing safety protocols while performing experiments
6. Troubleshooting experimental setups to ensure valid results
7. Maintaining a detailed laboratory notebook documenting procedures and findings

Competency 2: The student will apply theoretical concepts to practical scenarios by:

1. Designing experiments to test hypotheses related to motion and forces
2. Analyzing the relationship between energy, momentum, and motion through experimentation
3. Investigating fluid dynamics by measuring flow rates and pressure changes
4. Exploring oscillatory motion through experiments with springs and pendulums
5. Examining wave properties by conducting experiments on sound or light waves
6. Utilizing Newton's laws to predict outcomes in various experimental setups
7. Comparing experimental results with theoretical predictions to evaluate consistency

Competency 3: The student will develop data analysis skills by:

1. Organizing and presenting experimental data in tables and graphs
2. Applying statistical methods to assess the precision and accuracy of measurements
3. Interpreting graphical representations of motion, such as position vs. Time graphs
4. Identifying trends and patterns in collected data related to physical principles
5. Evaluating sources of error in experimental results and proposing improvements
6. Drawing conclusions based on data analysis and supporting evidence from experiments
7. Communicating findings effectively through written reports and presentations

Competency 4: The student will enhance critical thinking skills through problem-solving activities by:

1. Formulating research questions based on experimental observations
2. Applying analytical reasoning to solve complex physics problems
3. Collaborating with peers to discuss experimental designs and outcomes
4. Evaluating different approaches to solving real-world physics problems
5. Reflecting on the implications of experimental findings for broader scientific concepts
6. Integrating knowledge from the parent course to address interdisciplinary challenges
7. Proposing innovative solutions based on experimental insights and theoretical understanding

General Education Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information