Introduction

PHY2048L is a one-credit lab course and requires two hours of laboratory participation per week. Its experiments are on topics within the field of “Mechanics”, and thus serve as an experimental counterpoint to topics discussed in the lecture courses including PHY2043, PHY2053, PHY2048. Many topics will be treated earlier in the lab syllabus than in the lecture, so it is essential to read over the assigned lab manuals carefully before coming to the lab.

The main purpose of physics laboratory is to provide “hands-on” experiences of various physical principles. Theory of a physical principle will be introduced for each experiment, and the predicted results from theory will be tested by experimental measurements. You will learn in this course how a problem in experimental physics is tackled: how to organize the investigation, collect and record data, analyze the data, draw conclusions and present the results and conclusions in a written form.

Modus Operandi

1. The lab instructor who is in charge of each lab section will advise you at the time of Experiment #1 as to the time, place and manner of delivery for lab reports, how he or she will grade your reports, the penalties of late lab reports, etc.

2. Your instructor will usually spend the first few minutes of each session talking about the experiment to be done, and its underlying theory. He or she will also provide help with problems during the conduct of the experiment --- but is not there to do it all for you.

3. The physics lab is a place to learn and practice safety. Do not touch or turn on laboratory equipment until it has been explained and permission has been given by the instructor.

4. Students should do the no-computerized experiments individually.

5. Students can do the computerized experiments in group and share the measured data. However students should write the lab report individually (lab reports copied from others are unacceptable).

6. The equipment provided for the laboratory experiment is often expensive. Read the menu carefully to understand how does the equipment work and follow the instruction step by step. If you accidentally break some equipment or the equipment stops working during an experiment, report it to your instructor.

7. Students should let the lab instructor check their data before leave the lab. Students are encouraged to do the data analysis in the lab if they finish the measurements earlier than the lab schedule. Students may have chance to repeat some measurements if they find some problems from the data analysis. Moreover, students can learn more physics if they discuss the results together with the lab instructor right after the measurements.

8. Students will take at least 3 quizzes in a semester. The lab instructor will decide when the quizzes will be given.

9. The laboratory will not be open during the final week of the semester and all lab reports must be in the hands of your lab instructor by the deadline.
**Lab Report**

A typing lab report is required. Graphic papers must be used for plotting your data. The neatness, organization, explanations of your measurements and calculations in the lab report represent the quality of your work.

A suggested format for a lab report is:

1. Title of experiment, date of experiment, report date, your name and section.
2. The purpose of the experiment.
3. A short summary of the theory underlying the experiment.
4. Presentation of your results includes your raw data, further calculations from the raw data, comparison between the experimental and theoretical results, graphic representation of your results and the error analysis of the data.
5. The conclusions.
6. Do the exercises and answer the questions listed at the end of each experiment in the lab manual.
7. Students should write the lab report individually. Lab reports copied from others are unacceptable.

**Computerized Experiment**

Most experiments are computerized using the software "Laboratory Virtual Instrument Engineering Workbench" (LABVIEW).

Labview is a graphical programming language that has been widely adopted throughout industry, academia and research labs as the standard for data acquisition and instruments control software. Labview software, interface and sensors are used to make measurements accurately and rapidly, and to display, analyze data quickly and easily.

Labview programs are called virtual instruments (VIs) because their appearance and operation imitate actual instruments. However, behind the scenes they are analogous to main programs.

**Front Panel Toolbar**

You only need to use RUN and STOP buttons.
The Run button. You click on it to run the VI. While the VI is executing, the button changes to
- if the VI is a top-level VI, or
- if one of the VI callers is running at the top level.

While the VI is executing, the Stop button appears. Click on this button to halt the VI immediately.