

Introduction to Physics 012 - Introductory Physics Laboratory I

Course Goals

The goal of this course is to introduce students to laboratory procedures and keeping an accurate record of their experiments and results. Laboratory work is an essential part of science because it is how we test hypotheses and theories to determine which ones best describe nature. The more accurate the test, the more confidence we have in its results. Thus, we develop laboratory techniques and skills to perform experiments with the highest degree of accuracy as possible. In many of the experiments you conduct throughout this course, the quality of your results will directly reflect your measurement techniques and ability to follow procedures.

Once we obtain our data, we must analyze to understand its significance and application to the developed hypothesis and theories. A very important part of the analysis is the error estimate of the data. Without any estimate of error, we have no way to gauge the value or significance of the results. We also cannot compare the results to those obtained during different experiments. Error analysis is just as important as the values and conclusions you achieve during your experiments.

Special Projects

During the last week of the semester, you will conduct an experiment similar to one of the experiments, which you performed during the semester. The special project is a form of a test intended to measure your ability to conduct an experiment, understand the procedures, and reproduce accurate results. During the special project you will conduct the experiment by yourself and you will only be allowed to use your laboratory notebook to complete the project. Therefore, it is important to keep a very thorough record of your experiments.

Grades

A student's grade in the course is determined by the average of their 11 graded lab reports and special project grade. Grading of the individual labs is the responsibility of the lab instructress, with oversight from the professor in charge of the course. The grades for the course may be curved for each section, and the final letter grade may depend on your relative score to the rest of the students in your section. In grading the lab notebooks the instructress will look for things including: description of the equipment and procedures, accuracy of the results, error analysis, conclusions, neatness, and organization.

Notebook

Your notebook will contain a running account of your experiments you have performed in the laboratory. It is not meant to be a finished report or paper, but it should contain descriptions and explanations of the experiment such that you can go back at a later date and understand the experiment and your results. For each experiment, your notebook should contain the following:

- Title of the Experiment.
- The date and the name of your laboratory partner.
- A statement of the goals of the experiment.
- A description of the apparatus and equipment used in the experiment.
- A brief description of the measurement procedures.
- Data, graphs, tables, printouts, and equations.
- Analysis of the data and your conclusions.
- Ways to improve the experiment.

Your notebook should be clearly legible, neat, and contain all of the relevant information, such as units and equations. Neatness and clarity are two of the most important aspects of your notebook. While you may easily be able to read your own handwriting, someone else who uses your notebook at a later time as a guide may not be able to understand your work if it's not neat and well laid out. Also, any graphs or tables you have in your notebook should be properly labeled and have the correct units. A graph for example, should have the x- and y-axis clearly labeled with the correct units, a title, and a legend.

Final Comment

Your laboratory instructor is there to help you with the laboratory procedures and understand the material. However, they are not there to run the experiment for you, perform your calculations, or draw conclusions from your data. The process of understanding the strengths and weakness of your experiments, data, and relating the results to theory are very important parts of being a successful scientist or student.

Physics 012 Laboratory Schedule

Fall 2012

Week	Room 220	Room 222
1	Experiment 1 Date Measurement Accuracy and Error Analysis	Experiment 1 Date Measurement Accuracy and Error Analysis
2	Experiment 2 The Falling Body	Experiment 2 The Falling Body
3	Experiment 3 Centripetal Acceleration	Experiment 4 Balance of Forces
4	Experiment 4 Balance of Forces	Experiment 3 Centripetal Acceleration
5	Experiment 5 Friction	Experiment 5 Friction
6	Experiment 6 Collisions	Experiment 6 Collisions
7	Experiment 6, Continued Collisions	Experiment 6, Continued Collisions
8	Experiment 7 Rotational Dynamics	Makeups
9	Experiment 7, Continued Rotational Dynamics	Experiment 8 Simple Pendulum
10	Experiment 8 Simple Pendulum	Experiment 7 Rotational Dynamics
11	Makeups	Experiment 7, Continued Rotational Dynamics
12	Experiment 9 Speed of Sound	Experiment 10 Specific Heat
13	Experiment 10 Specific Heat	Experiment 9 Speed of Sound
14	Special Projects	Special Projects