

# Physics 135/163 Introductory Physics Labs

## PLU Department of Physics Intro Lab Course Policies

### Lab Reports and Evaluation

- Each student must keep a bound lab notebook, preferably one with at least some gridded pages, or a 3-ring binder to hold lab notes.
- Lab notes should contain clearly marked tables, calculations and sketches that summarize the data, conclusions and configuration of the experiment. If data sheets are included with the laboratory instructions, they should be completed and attached to the lab notebook. Your notebook should be complete enough that a knowledgeable reader would be able to replicate your experiment based upon the written account you provide in your notebook.
- Two quizzes will be given (see the lab schedule). You may NOT use the department-issued laboratory manual during these quizzes, though you will be permitted to refer to your lab notebook, post-labs, and any handouts that your instructor may have provided. Therefore, it's important that your notes and calculations be clear enough for you to extract information from them.
- Students are expected to complete the pre-lab exercises before coming to lab, and may be prevented from starting the lab without a completed pre-lab.
- Students are expected to demonstrate respectful and positive collaborative group work with their lab group members, including helping with setup and tear down, data taking, analysis, and group discussions. Students demonstrating inappropriate group behavior may be removed from their lab group.
- Your weekly lab exercise will be successfully completed when your lab report meets the approval of your lab instructor and s/he records your lab as having been completed. If your instructor does not give his/her approval of your report, you must continue working on the lab until it meets your instructor's approval. A student who leaves the lab without obtaining the instructor's approval will not receive credit for that lab.
- A student who successfully completes all the labs and takes both lab quizzes will be assured of at least a "C" grade for the course. A student with one absence will receive a lower course grade; two unexcused absences will result in failing the course. Performance on the laboratory quizzes will provide 90% of the basis for assignment of grades higher than C, and post-lab exercises account for the remaining 10%. There is a spreadsheet on the course page that will allow you to calculate your course grade. However, at the discretion of the instructor, you may be asked to turn in your lab notebook at the end of the semester. The quality of the notebook may be used as a grade bump in borderline cases.
- A student may not attend another lab section without the approval of the instructor of that section. That instructor must report the student's completion of the lab to the student's regular lab instructor before the student will receive credit for the lab.

### Guidelines/hints for your lab notebook

When deciding what you should write in your lab book and how you should write it, the basis for judgment is utility. The first reason to keep a scientific notebook is to keep track of what you've done, so you don't have to waste time repeating yourself. Your record should be complete enough so that you

can still understand what you've done if you were to look at your work six months later – or six weeks later, during your lab quiz.

- Don't cram everything into a small area on the page. Spread your writing and drawing out.
- Be complete, but not verbose. Complete sentences not necessary. Well-labeled sketches are effective.
- Label everything adequately. This includes titling the lab, as well as calculations, tables of data, drawings, graphs, analyses, etc.

In the professional world, your work will probably be challenged; you will be asked to justify your conclusions or interpretations. Your lab notebook (or equivalent) will be your best instrument for defense. Therefore, it should contain enough information to respond to the skeptic (e.g., your thesis supervisor or your project manager) who asks:

- What apparatus did you use?
- What data did you take and how did you take it?
- How good/reliable are your data? What is your experimental precision, and how did you estimate or measure it?
- Why did you take that data? How do (or did) you plan to transform that data in order to get your final result?

In addition to these topics, lab books often contain the first preparatory steps toward the interpretation and publication of the results. Your lab book will also serve as a lab report, so it should also contain a brief presentation of your results, the analysis necessary to extract the results from the data, and the conclusions that you can draw from the experiment. The report will usually include all or most of the following items:

- Completely labeled graphs and tables of raw and derived data values.
- A record of how the raw data were used in calculations of other numbers.
- A record of how the uncertainties in the various results were determined.
- Reasons why you should have confidence in the results. These reasons usually are in the form of cross-checks: either with previous experimental results, from independent sources, or theoretical calculations.

### **Department of Physics Learning Outcomes**

The following Learning Outcomes are covered in the introductory lab classes:

- Learners will be able to demonstrate and apply their understanding of fundamental concepts by successfully solving a variety of physics problems in different contexts.
- Learners will be able to create, analyze, and deliver effective written and oral scientific communication.
- Learners will be able to demonstrate effective collaboration in group and team environments, such as group problem solving and laboratory experiments.
- Learners will be able to computationally solve physics and/or engineering problems using software packages such as spreadsheets, numerical integration, matrix multiplication tools, or symbolic manipulation (computer algebra) systems, as appropriate for employment or for further study and research.