PHY 224 Lab Book Guidelines

December 6, 2018

PREPARATION

Read the lab instructions and highlight or make a note of the key questions. Make sure you can clearly state the objective(s) of the experiment in your own words before you start the lab.

The basic overall goals of your lab book

1. Keep a log of what you're doing and what you're observing.
2. Record your data.
3. Using your observations and computational analysis, answer questions posed in the instructions. *Your submission should not just be the answers to questions. You need to provide context and discussion.*
4. Interpret your results.

Whether taking notes on paper, or a computer **Be concise in your report but include sufficient detail to reproduce your work. Comment your code to make it clear what you tried to do.**

LAB BOOK

INTRODUCTION

At the top of your report, give the experiment name and student names. The date you performed the experiment is helpful too.

Before providing data, write down the overall objective(s) of the experiment in your own words. This serves as a basic introduction and will help guide your experiment.

LOG AND DATA

1. **As you do the experiment**, write down what you are doing and what you observe. If you ask a TA for assistance, they will be more helpful if you can show them your progress. Your logbook should be as chronological

as possible. If you're taking notes on a computer, you can restructure the notes for your submission to make things clearer, but you shouldn't remove information. *You or another student should be able to recreate your results based on your log.*

2. **Record everything you observe**, even if it's not directly stated in the instructions. You never know what observation may be interesting or useful to you later. You should record settings on instruments and the experiment station you used.

3. **Record uncertainty** on all observations. If you have time, doing multiple trials on certain experiments can improve your estimate of uncertainty and improve your results.

4. For small amounts of data, a table is often useful for recording and reporting numerical observations such as times, lengths, speeds, etc. Reserve a page or two for this if applicable.

5. **Include relevant plots of data**. In some experiment manuals your are asked for particular figures. Be sure to include all required figures. Additional figures can be included if they are relevant, but be sure to label them appropriately.

Questions and analysis

1. Following the log and data presentation, answer questions asked the instructions. Back up your answers with the observations from the experiment and provide context and discussion. **don't just answer questions as you might in a theoretical assignment. The experimental setup is just as important**.

2. State equations clearly before using them. Show your workings and make sure they follow a clear and logical progression. Use units and error. Propagate uncertainties in the most appropriate way for the calculation you are making.

3. Python code used for analysis should be commented for clarity. Graphs and tables should be clearly labeled.

4. Numerical results and graphs should always include uncertainty, and you should give your interpretation of their meaning.

Discussion / Conclusions

1. At the end of your experiment, discuss the results in comparison to any known values. Always consider the uncertainties you have calculated. What results were expected or unexpected? What changes or improvements might you make if you were to repeat the experiment?

2. Compare experimentally determined values to known values where applicable. Make sure to check if the values agree **within the range of uncertainty**. If they do not agree, explain why (for example, inaccurate observations, assumptions made, extraneous factors not taken into account, etc.).

Computational analysis

1. If you're submitting hardcopy report, print and attach any python code, code output, and graphs used for the analysis. Make sure to include comments in your python code.

2. If you're submitting online, include a separate python file and enough data files for the TA to run the code to perform the analysis and plot data.