

PHY431 – Optics, Fall 2009: Requirements for Laboratory Notebooks.

Learning to maintain a laboratory notebook is one of the most important skills you have to develop to become an excellent experimentalist. In a research setting, this Notebook can have a legal status because it provides written proof of when an important discovery was made. A good laboratory notebook is essential when you begin to write papers or to develop oral presentations summarizing your experimental reports. A clear well-written narrative that includes experimental schematics, plots of raw data, and details of your analysis methods will enable you to receive quick feedback and assistance during lab sessions from peers, TA's and instructor. A poorly maintained notebook will prove immensely frustrating to you and your instructor. It is very difficult to answer questions like 'why didn't the experiment work' or 'why was my result off by an order of magnitude?' without being able to clearly and easily trace your efforts using your notebook.

You are required to use the composition notebooks given to you for the Optics Labs. **Bring your notebook to every lab session.** Failure to do so will result in penalties to your grade!

Your notebook should contain diagrams, narratives, tables of raw data, formulas, computations, reduced data, error analysis and conclusions in a neat compact, orderly arrangement. This record should be readable at some later time by you or anyone else. Most importantly, there should be enough information so you easily reconstruct what you did in the lab sessions.

The following is a list of guidelines to follow when performing laboratory work.

- Writing results down on pieces of paper and then copying them later into the notebook is not allowed. Don't ever erase, use white-out, or tear out pages of a lab notebook. If you make mistake, just cross it out (but leave it legible, in case your "mistake" wasn't so) and write down the correct input. These may prove to not so incorrect as initially thought and will very often be useful as a guide to how the experiment was done and provide clues on how to better execute the experiment next time.
- Create a descriptive table of contents and make an entry every time you add new material. Title the TOC with the following: Date – Contents – Page. Use descriptive headings that will be useful later on when reviewing your notebooks.
- **Number and date every page.** Each day's entry should begin with a date, time, a brief statement of what you plan to do. Preparatory questions and solutions should be written in your lab notebooks. Following the preparatory questions, state the essential physics of the experiment in your own words. List your experimental objectives and how they relate to the essential physics. After listing the objectives, identify the things you will have to do, the data you must obtain and identify the required calibrations.
- During the experiment, you may want to record other times because the phenomena you are observing might be time dependent.
- Careful drawings of your experimental set up must be done. Of course, with advent of digital cameras, it is acceptable to photograph your apparatus and paste an annotated picture of it into your notebook. However, it will probably be easier to draw some diagrams describing optical paths by hand.
- Estimates of systematic and random experimental errors should be recorded. "How accurate is my caliper and to what precision did I measure that distance?" "Does the instrument read zero when there is no signal present?" "Is the reading drifting with time?"
- Sometimes you will be taking data with a computer, and you certainly will be using a computer to create graphs. It is very important to **record in your notebook the names of these data and graphing files.** Likewise, if you write a program to analyze your results, you should record the file name.
- At the end of each session, make a summary of your accomplishments and unresolved problems. This can be useful for you to **write a lab report outside of your normal lab sessions.**
- We may collect your notebook at any time in order to evaluate how you are doing. After Lab #10, we will evaluate your notebooks and select the best top 20% (5 notebooks) to award extra bonus points (2 out of 100 of the total final grade).