

Laboratory notebook guidelines

MAS.450/854

Holographic Imaging

Philosophy

For the price of a citation, scientists gain the use of the experience, knowledge and observations of their predecessors. The scientific method only works, though, when people share their ideas in a way that others in turn can learn and benefit. The most obvious form of this sharing is a published paper, which transforms the work of one into a resource for many. After this course has taught you the basics of holography and laboratory technique, you'll have a chance to do a project where you could do your own independent research from which publication could result. However, we do not require (or even expect) that your final project be so ambitious a task. Rather, our emphasis is more upon good documentation of observations, procedures, and results that can be used by you and perhaps others as the record and proof of old ideas and as the basis of new ones.

The laboratory notebook is the primary tool of scientific documentation. There are many different philosophies of lab notebooks. Many of you had to write up labs in high school: they were very scripted and formal and neat. They taught you what should be in a lab report, but they didn't give very valid insight into how scientists really work. The experimental method isn't about not making mistakes or following an exact form. It's about documentation: explaining what you're trying to do, outlining (and drawing) how you're going to do it, recording your observations, hypothesizing what they might mean, working out your calculations in a way that you can spot mistakes, and so on. It's your proof of what you've done, both for yourself and for the world. The ability to create a good lab notebook is one of the most important and useful laboratory skills you can develop; we will help develop this skill during the course and the quality of your notebook will factor significantly in the laboratory portion of your grade.

A well-maintained lab notebook is important and useful for several reasons:

- It is your contribution to the continuation of the process of science; your successes and mistakes are lessons from which others can learn,
- It is a vehicle for you to learn from your own previous work and ideas, to make improvements and develop new insights,
- It serves as documentation and proof that you have actually done the work you claim to have done, which can be critically important in the case of patents and similar awards.

The lab notebook that you assemble for this class may be the first one you've ever needed to use, but chances are it will not be your last. Most industrial and research scientific laboratories require notebooks to be kept, and in fact consider them to be the property of the company or institute. Develop good documentation skills in class and you'll be better prepared for the corporate lab environment. Although lab notebooks are not as accepted in the world of computer software engineering, they offer a convenient way to organize your thoughts on software and algorithm design.

Formatting details

We want your laboratory notebook to be as close to an "industrial" lab book as possible. That's different from the lab reports you wrote up in high school. Here are some formatting recommendations for lab books for MAS.450:

- Use notebook with gridded paper to make drawing technical diagrams easier. These notebooks are available from the Coop and places such as Bob Slate Stationers. The choice of notebook style is up to you: you may find that spiral bound books are easier to work with in lab, as long as the paper doesn't easily rip out.
- A notebook with carbon paper for producing a "turn in" copy isn't necessary in this class; we'll evaluate the entire notebook as a whole in the middle and at the end of class.
- Don't erase or obliterate text from your notebook. What you think is a dumb or expendable idea may be the real insight of your work, or a hint or proof how you arrived at more accurate conclusions. Instead, cross out errors with a single line, leaving them legible.
- Many lab notebook guidelines recommend the use of black pen only to improve the quality of photocopying. In the case of this lab, we do not anticipate a pressing need to photocopy, and at any rate, color copiers are much more common than they used to be. Therefore, we encourage you to use color pens to improve the lucidity of your lab reports. For instance, you might use a particular color for text, another for optical components, and yet another for beams of light.
- Don't do your problem sets in your lab notebook. For our sanity, don't intermix the lab reports from another class in with holography.
- Leave the first few pages of the your lab notebook free for use as an index, and keep the index updated. Either purchase a lab notebook with pre-numbered pages, or number them just after you buy the book.
- Your lab notebook is primarily a tool for use in lab. Don't save up all your lab notes, produce an exquisitely neat report at home, and then throw away the notes. In cases where you need to make conclusions or perform calculations after class, either leave a SMALL, LABELLED space for that future work, or add it as the next entry of your lab notebook, LABEL, and CROSS REFERENCE it with your index and lab.
- Avoid blank pages (or even spaces) in your notebook; in a corporate environment, they offer too much of an opportunity to insert out-of-sequence entries that can invalidate intellectual property claims.
- Some people like to paste copies of their lab handout into their lab. That's fine, as long as you paste neatly and securely.
- Don't forget to record information about the chemical processing used to make the holograms in each lab.
- Your lab notebook will be returned to you after we've graded it for the last time (after final projects), so you can use it as a continuing lab book if you choose.

If you have any other questions about lab notebooks, please ask your TA or one of the instructors.