

Laboratory Notebooks

Question & Answer

Revision 1.0
January 2001

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This document is intended to provide a brief overview of laboratory notebooks* by using a series of questions and answers. This document does not provide specific details regarding notebook requirements for a particular course. Rather, it is meant to provide the basic principles behind, and structure of, a well-documented laboratory notebook. Specific requirements will vary from course to course, and from project to project†. The information presented here is based on comments from faculty and on the excellent reference book “Writing the Laboratory Notebook”, by Howard M. Kanare, American Chemical Society, Washington D.C. 1985.

Q: What is a laboratory notebook?

A: A laboratory notebook is a permanent record of a persons work on a project. It contains all the notes, analysis, and results generated during the project. The laboratory notebook is meant to be a permanent document. As such, loose-leaf paper or three-ring binder notebooks are unacceptable. The permanency of the document is important for legal, as well as practical, reasons. Bound pages, initialed and dated in chronological order, provide a strong basis for patents and other legal claims of invention or discovery. From a practical perspective, bound pages prevent the accidental loss of separate pieces of paper. How often has someone jotted down an idea or phone number on a scrap piece of paper, only later to forget where he put it.

Q: Who needs to keep a laboratory notebook?

A: Anyone who works on a project should keep a laboratory notebook. Laboratory handouts and scrap pieces of paper are not appropriate places for recording measurements or sketching schematics. Managers should keep one in order to maintain a record of the project’s progress, from conception to implementation. Similarly, the scientists or engineers working on the project need to keep an accurate record of exactly what they did, how they did it, and the results.

Q: Why should I keep a laboratory notebook?

A: A laboratory notebook provides a single, permanent repository of information for a given project. In one sense, the laboratory notebook can be viewed as a narrative history of a project. In another sense, it can be viewed as a technical manual for the project’s design, analysis, build, and measurement. Both in industry and the academic community, projects typically result in reports, patents, journal articles, or other types of publications. A well-kept laboratory notebook will contain all of the information necessary to generate these papers. In addition, the ability of you or someone else to reproduce your results is very important. By keeping a well-documented laboratory notebook, you will be able to look back at what you did years from now and see what you did, why you did it, and reproduce the results if necessary.

* Laboratory notebooks are often referred to by other names, including project notebook, engineer’s logbook, and research journal.

† The term project is used to refer to any number of different types of activities, including laboratory experiments and research.

Q: When am I supposed to use my laboratory notebook?

A: You should use your laboratory notebook whenever you are working on the project. The more you put into the laboratory notebook the more useful it will become. Notes from phone conversations, meetings, and tours are very helpful. Do not expect to remember the person's name you talked to and the details of your conversation. Write it down. When performing an experiment, record exactly what you did. This includes more than just the measurements. Someone else should be able to generate the same results by simply following what you have written in your laboratory notebook.

Q: What am I suppose to put in my laboratory notebook?

A: The exact information varies greatly depending on the type of project. A three-hour laboratory experiment that verifies Ohm's Law is vastly different from a three-month project to develop an automatic drive system. There are, however, some basic elements that belong in any laboratory notebook. The first several pages should be reserved for a table of contents. The table of contents should contain the date, page number, and title (or short description) for each entry in the laboratory notebook. Sections should have distinguishable and descriptive titles. Every page should be dated and initialed by the author at the time of recording. Many laboratory notebooks provide spaces for the page number, date, and author initials. Wherever you put them, be consistent.

Other types of information that belong in the laboratory notebook can be placed into three different categories: conversations, analysis, and experiments. Conversations include meetings, interviews, phone calls, tours, etc. You should keep a record of the individual's name, title, company name, and phone number. Business cards typically contain all of this information and can be stapled directly into the laboratory notebook. You need to be able to contact the individuals at a later time if necessary. Other things to include are important topics or ideas discussed. For example, when talking to a vendor it is helpful to write down the specific part number, packaging, quoted prices, and delivery times.

The second category includes theory, analysis, and design work. It is important to write down the reasons for the analysis. Are you trying to determine a voltage? Build a bridge? For designs, you must indicate what the exact specifications. Any assumptions that are made should be noted. Equations should be written in a logic order with meaningful comments to guide the reader. Schematics and diagrams should be legible and complete. Drawings made on the computer should be printed out and stapled into the laboratory notebook. Be sure to include a description of every drawing.

The third category is experiments. As mentioned previously, you need to include enough detail to accurately duplicate the experiment at a later time. This includes a complete list of materials and components as well as the type of measurement equipment. When recording the results it is important to also note the method of

measurement. How did you measure the speed of the pendulum? The numerical results should be clearly labeled – don't forget to include units. Data can often times be put into tabular or graphical form. As with drawings, tables and graphs can be produced on the computer, printed out, and stapled into the laboratory notebook.

Q: How do I keep a worthwhile laboratory notebook?
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A: A worthwhile laboratory notebook contains the details necessary to not only remember what you did, but to also be able to duplicate your work. A reconstruction of events and activities over the past days or weeks from memory is very unreliable. Many important bits of information can and will be lost over time. To be effective, the laboratory notebook must be kept up-to-date at all times. This means taking time during an experiment to write down exactly what you built and how the measurements were made; or during a phone conversation to record the person's name and phone number; or during a brainstorming session to sketch the various design ideas. The key is in the details. Another important thing to remember is to keep a meaningful table of contents. A few minutes spent in adding entries into the table of contents can save you hours in searching for that one bit of information that you know is somewhere in one of your notebooks. Date and number the pages and include noticeable headers to clearly identify each section.