Lab Journal

A well-kept scientific notebook/journal provides a reliable reference for writing up materials and methods and results for any study/experiment. Knowing how to create and keep a scientific journal is a skill that all engineers should master. Additionally, a proper scientific journal is a legally valid record which can serve to document and preserve the intellectual property rights for your potential discoveries. And perhaps even more importantly, a comprehensive notebook/journal permits another engineer, if need be, to reproduce any part of a documented task or methodology completely and accurately.

What to record

Above all, it is critical that you enter all procedures and data directly into your notebook in a timely manner, that is, while you are conducting the actual work. Your entries must be sufficiently detailed so that you or someone else could conduct any procedure with only the notebook as a guide. Few students (and not that many researchers for that matter) record sufficiently detailed and organized information. The most logical organization method for notebook entries is chronological. If a proper chronological record is kept in a timely manner, and even better if it is co-signed by a coworker or supervisor, it can be utilized as a legally valid record. Such a record is necessary if you or your employer are to maximize the ability to preserve your rights to your discoveries.

Depending on requirements set by a teacher, supervisor, company, or other entity, you may not have to confine your notebook entries to discoveries/lab notes only. For example, a student might record his/her class lecture notes, lab lecture notes, ideas, questions, library research notes, and notes that are part of any pre-lab preparation. Generally, the bare minimum entries for an academic lab course, for each lab study, should include 1) the title of the lab study; 2) introduction and objectives; 3) detailed procedures and data (recorded in the lab itself in "real time" the day of the work); and 4) summary/conclusions/challenges.

We usually record a lot more information in a laboratory notebook than we would report in a research paper. For example, in a published article we don't report centrifuge type, rpm, rotor type, or which machine was used. However, we do want this type of detail in a notebook. Why? If a procedure is unsuccessful, you may want to check your notes to see that you used the correct rpm or correct rotor. Perhaps the centrifuge itself was miscalibrated. And if you

wanted to repeat the procedure at a later date, you would need to know all of the small details as well as the big details, include which machine you used.

Another example of the differences between research papers and notebooks: in a research paper one does not report which person performed which tasks, because such information is useless to a third party. However in the notebook it is important to note who was responsible for what procedure. Again, you may need such information to troubleshoot your experiments.

Notebook Rubric for This Class

Each of the categories below will be assigned a graded value of poor to excellent (1-5) for your notebook work. Each category is then weighted by the listed factor to give a total of 100 points possible for the overall notebook grade.

- Observations/Conclusions (5) – Did you record interesting things that you noticed and make hypotheses as to their cause; did you document the actual causes/conclusions when discovery was made as to their true cause; did you compare actual results to hypotheses and summarize why the hypotheses are same or different from results?
- Simulink Diagrams (3) – Did you show code and block diagrams used; did you sufficiently label each diagram and blocks within said diagrams/code? Note: Showing zoomed-in sections and/or showing segments of the code as you progress can be helpful in this segment.
- Scope Graphs (5) – Did you show graphs of both successful and not so successful results; did you make notes on the graphs to support observations/conclusions? Note that showing graphs and notes is crucial!
- Organization and Flow (2) – This grading is an overall assessment - Is your work easy to follow? Can someone understand and follow your chronological experience? Could someone replicate it?
- Depth/Detail/Completeness (5) – In an overall sense does your journal feel like it was not rushed? As a reader do I feel confident that all important data was captured?