

# Lab Write-up Guidelines

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## **Purpose:**

Making your laboratory write up neat and organized has several important purposes:

- 1.) An important part of being an engineer or scientist is presenting your work in an understandable and professional format.
- 2.) At work or in school, neat and organized work connotes clear thinking and competence. Messy or incomplete work simply shows others laziness and incompetence.
- 3.) Helps in quick and accurate grading. The grader can more easily see what you've done and give partial credit when appropriate.
- 4.) Allows the student to see mistakes more easily.

## **General Guidelines:**

- 1.) Laboratory write-ups must be typed or word-processed. Do not use paper that has other writing on it for your write up. For example, don't use scrap paper from the printer.
- 2.) Keep your write up concise, accurate, and complete.
- 3.) Use only the front side of the page. Work on the backside may get overlooked.
- 4.) What you hand in for grading must be a neat and organized final draft of your work. Do scratch work in your lab notebook. Then recopy the necessary work into your final draft.
- 5.) Include a title page that has your name, date, class, section, and laboratory station number clearly indicated. Each student must turn in his or her own report.
- 6.) Diagrams and/or equations can be drawn. Draw them neatly. Be sure to completely label your diagram and each of its parts.
- 7.) Clearly label each part of your write up (Title, Objective, Data...).
- 8.) Write down the necessary equations, laws, and definitions. Again, this keeps the work clear for both you and the grader, as well as helps you to learn some of the material.
- 9.) Staple you papers together in the correct order. Place a staple in the upper left hand corner so that the grader can see all of your work.
- 10.) When finished with the report write-up quickly scan over and determine if the report would make sense to someone who did not perform the experiment with you.

## Lab Report Layout

Include each of the following topics in your report.

**Use complete sentences!**

### Title:

- Include the title of the experiment.

### Objective:

- The objective is a few concise sentences about the goal of the experiment. Be careful here, you will need a clearly defined objective in order to discuss the success of the experiment in the conclusion.

### Data and Calculations:

- Record any qualitative observations you made during the experiment.
- Tables are usually the clearest and most concise way to present your data and/or calculations. Every table should have a label and headings (with units) for each column and/or row.
- To avoid confusion include the context under which the observation/data was taken. This will add a little extra time and effort but the rewards of clarity and a better grade outweigh the extra time spent.
- Since data manipulation may hide what your original data was, always copy your original data from your notebook to your write-up.
- Many times, the results of your calculations (including error calculations) may be shown in the same table as your original data. Just add another column.
- Include one sample calculation of each calculation performed. For very simple calculations, simply indicate the formula you used.
- Always indicate units in every calculation. Be certain you know what units you are using at every step of the calculation. To be safe, almost all calculations should be done entirely in MKS (meters-kilograms-seconds) units.
- There should be little or no discussion of your data in this section unless you need to clarify how you handled your data or performed a calculation. Save the discussion for the Results and Conclusions. However, be certain to label your tables and calculations.
- Graphs should be at least half a full page and should be clearly labeled. Labels should include a title, x-variable and y-variable with units in parenthesis, and scales on each axis. Also, provide a legend if you have more than one plot on the same graph.
- Remember, your data and calculations may not come out as expected. If this is the case, don't panic. Perform the calculations as instructed and then discuss the reasons for the discrepancy in your Conclusion section (see below). Sometimes you learn more from a lab gone bad than from one that works.

## Results and Questions:

- This section restates the important results of your data and calculations section. For example, it states what numbers (with units) your calculations gave you, what your percent errors and differences were, etc. This section is not for answering the questions “Why?” or “How?”. Save that discussion for the Conclusion section.
- Additionally, this section points out any qualitative generalizations you can draw from your data. For example, how did your measured variable (dependent variable) depend on the variable you controlled (independent variable)? Did it increase linearly? Did it decrease exponentially? Was it constant?
- Also, state or generalize any results that you can draw from your qualitative observations.
- Sometimes this section is unnecessary or redundant. In which case, it can be combined with your Conclusion. Use your discretion to determine on which labs you should merge the two sections.
- Answer all questions posed to you in the lab manual. Sometimes, there are some important questions that need to be answered in order to meet the objective, but are not directly stated. Think about this carefully and answer any such questions here.

## Conclusion:

- This is the section where you discuss why or how the results of your lab came out the way they did.
- Discuss how well the lab met with the Objective and why. The theory behind the experiment will usually make some prediction about how the results should come out. Did your experiment confirm the theory? If not, why not? How far off were your results from the theory? (error calculations come in handy here, they give you a quantitative measure of how well your theory was matched.) Give reasons why the theory and experiment did or did not match. These reasons may be due to physics, bad theory, or they may be from procedure (see error analysis below).
- Perform error analysis. This is where you discuss what may have caused your errors. Some types of error include (see your lab manual for more information on these and other types of errors):

Instrumental Uncertainty

Systematic Errors

Random Errors

- Make sure that the reason you are stating as the cause of your error predicts whether your results will be too high or too low.