Note on Lab Reports

Introduction and Basic Guidelines

A scientific lab report is a complete story. A report should always address the following basic questions:

- What were you trying to do? (purpose and theory)
- How did you do it? (experimental procedure)
- What results did you get in the lab? (measured data)
- How did you analyze, process or use your results? (analysis)
- What is your interpretation of those results? (conclusions)

Each student always submits his/her own lab report. Copying of partners’ measurement data is permissible and teamwork is encouraged. Copying of "theoretical" work and written text is not permitted. Each student should verify measurements, i.e. do not have one person operate the instruments and the

Section Guidelines

Each section of the Unit report should contain clear statements in grammatically correct, properly punctuated English with correct spelling.

1. **Authorship:** Include your name, date, and partner at the upper right corner, or on the cover.
2. **Title:** Title from syllabus, lab handout or class discussion.
3. **Purpose:** A description of why you are doing this experiment. What are you attempting to verify, demonstrate, examine, measure, etc.? This section would contain a mention of the steps of the lab report: “the first thing that was studied was ___, then we went on to determine ___.” Do not begin an experiment unless you are prepared to write this section. The purpose may be a sentence or a paragraph, depending on what is needed.
4. **Theory and Introduction:** A general discussion of the ideas and methods behind the experiment. Where are you going with this activity? Why are you doing it this way? What are the principles behind the equipment you are using and the mathematics you will use for analysis?
5. **Procedure:** A description and explanation of what you actually did in the laboratory; it should clearly show each of the steps in the Unit write-up. This section should allow a knowledgeable physicist, unfamiliar with your experiment, to repeat your measurements with similar results. A circuit diagram and a sketch of the measuring apparatus used (a "block diagram") with appropriate labels is extremely helpful here. Subsequent references to such figures allow for simplifying your discussion and explanations.
6. **Data:** A datum is a specific actual measurement or "on the spot" observation recorded in your lab book during the lab. You are encouraged to re-copy or reorganize raw data in tables or charts for clarity of presentation. Reports, however, SHOULD NOT include the raw data taken in the lab. This is best presented as a reference to the lab book ("see Table II on page 14") as long as it is legible and organized.
7. **Analysis and Interpretation:** Mathematical manipulations of data (with representative calculations showing actual numerical values and units, not just formulae), graphs, diagrams and error calculations are shown here along with commentary on the reasons for the calculations, graphs, etc. Interpretations of observations, trends or partial results are also appropriate, and in fact, are encouraged. Make sure your graphs are properly labeled! Make sure that your graphs are
explained and discussed in the text! You can point out the interesting parts and what they tell the reader.

8. **Conclusions**: A summary of what you accomplished (Did you achieve the stated purpose?), why you believe these results are valid, and how good your results really are (your error). Be very careful here. This is where you tell what you really learned. You can do this step by step, if you like, instead of in a separate section at the end of the report.

**General Suggestions**

- Be thorough, but succinct. Scientists are impressed by quality, not volume.
- Be honest. Falsified science is not science at all, but fraud. Reports are not only graded on getting the correct results. They are graded on form, propriety, and the quality of your understanding as presented in your report.
- Be neat and organized. Show a professional interest in the final product.
- Make an attempt to interpret what happened, good or bad. If you are uncertain about some aspect of the results, make that clear. Many valuable scientific papers have expressed confusion about the results, leading others to investigate further.
- Make at least one draft or rough copy of the report, read it through, making corrections for the final report.

**Some "Don'ts"**

- Don't use pencil if you write very lightly.
- Don't use handwriting unless your penmanship is easily legible.
- Don't forget your coworkers. (Section 1)
- Don't write the purpose until you have thought about how you will word your conclusions. The beginning of the report should be actually written last. (Section 3)
- Don't assume principles behind the lab are obvious to anybody. Make them clear. (Section 4)
- Don't include an equipment list. Use block diagrams and verbal explanations. (Section 5)
- **Don't assume the reader knows what you did.** Report is read (and graded) from the point of view of a physicist who has never done this lab. (Section 5)
- Don't try to explain the operation of an apparatus without a diagram or sketch for reference. (Section 5)
- Don't assume the operation of an electrical circuit or an optical set up is understood. Explain how it works. (Section 5)
- Don't list calculated values as raw data. Data and processed results may be combined in tables, but they must be clearly labeled as such. (Section 6)
- Don't say the experiment was a success without saying what you succeeded in doing. (Section 8)