UNIVERSITY OF OKLAHOMA
PHYSICS 3302/3312 LAB

LAB BOOK WRITE-UP INSTRUCTIONS

Keeping an organized concise lab book is extremely important for any scientist or engineer. This is not only for laboratory work, but for any project, especially an on going one. I suggest you use the back part of each page for rough notes, ideas, rough drawings and even preliminary measurements. The front part of each page should be reserved for more finished work. This finished work should still conform to the usual experimental format of Abstract, Introduction, etc. To achieve this organization you *may* want to leave space for different sections and come back to them later, *i.e.,* the ABSTRACT appears first but is written last. If you are careful when you tabularize your results you do not need to recopy much of your data.

The Junior Lab write-ups are intended to demonstrate that the student has a thorough knowledge of the material covered in the experiment. The student should accurately report his or her results even if they are not ideal. Usually points will not be taken off if poor results were obtained using the correct procedure. Rather, if the data is poor, a discussion of what went wrong, and what could be done to obtain better results should be given. The reports should be similar in style to a scientific journal article such as Journal of Applied Physics, Physical Review A or B, etc. In other words, the report should have distinct sections such as an introduction, procedure, results, etc. The report should be easily understandable to the reader with a scientific background giving a clear picture of the experiment done and the results obtained. The following format should be used as a rough outline of the lab reports:

ABSTRACT

The abstract is a digest or summary of the experiment described. It should be quite brief and should be written assuming that the reader knows the normal terminology of the equipment used and the type of experiment performed. Where ever possible, final results should be quoted including the probable error of the final results.

INTRODUCTION

Briefly describe the relevance of the experiment both in a historical context and in terms of why making an improved measurement may still be of interest now. Most of this information should be in the experimental packet. If you use another source, reference it properly.

THEORY OF THE MEASUREMENT

Describe the physical principle(s) that you will be trying to measure. Derive the equations that govern the phenomena you will be studying. Qualitatively discuss some of the physics you must understand in order to make the measurement (*e.g.* why a heated filament is necessary for an electron gun). Much of this section will be motivated by the handout included with the packet. Answer questions (*typically in italics*) explicitly.

APPARATUS

Make a sketch of the apparatus that includes all the pertinent information necessary to set up and run the apparatus. If there are critical parts, separately make enlargements of these parts. Also, if there are critical settings, make careful note of these.

PROCEDURE

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Describe the experimental procedure you followed. This should be a revised version of that which you developed and handed in before you did the experiment. Include sufficient detail so that you can recall all details of the procedure you followed. Also discuss any improvements to the procedure you developed during the experiment. In many experiments it will be necessary to take steps to demonstrate that the apparatus is performing as it should.

SUMMARY OF DATA

In most cases it will not be necessary to give all of the data taken in the laboratory, since these
data will include many facts necessary only to the individual student. For example if Test Meter No. 3 is used in the experiment, it is worthwhile for the student to note that fact in his notes, but it is usually not worthwhile to give this information in the report. A summary of the essential data is to be given; depending on the nature of the data, this summary may best be given either in tabular form or in graphical form.

RESULTS

This section should include your final results and an estimate of the probable error of these results. In most cases a sample calculation should also be given to indicate more clearly how the results were obtained. Note that the estimate of the probable error of the results is extremely important. Give some idea how your estimates are arrived at, and how the errors are combined. Particular emphasis should be given to those one or two errors that give the largest uncertainty in final results.

DISCUSSION

This section can be combined with the RESULTS if convenient. Here, discuss your results and their errors. Compare the results or values to the expected or accepted results or values. Is the percentage difference within your estimated error? Explain the disagreement. You should be able to decide if the difference is systematic in nature. If systematic error is observed, what do you think is the source of this error? How would you make the measurement differently in order to reduce this source of systematic error?

CONCLUSIONS

In this section, summarize your work. State the effect measured, the results determined (with error) and compare these with the accepted results. Suggest reasons for disagreement.

FINAL SUGGESTIONS FOR THE LAB REPORTS

The lab reports do not need to be typed up. Rather, each student should buy a brown notebook with scientific or engineering type paper (grid paper). These are easily obtainable at the University bookstore. The write-ups should be handwritten in these notebooks. Typically, the left hand side of the page is used as a scratch pad where rough calculations and notes can be written. The right hand side of the paper can then be used as the more formal lab report. On these pages, try to be as neat as possible and use a format similar to the one given above.