Physics 118 Laboratory: Laboratory Structure and Requirements

General Comments and Introduction

Laboratories offer an important "extra dimension" to your study of physics. In lecture you will be presented with a number of general concepts in the form of physical laws and principles that you will be asked to apply to the solution of a variety of problems. The approach is deductive in that you are asked to proceed from the general to the specific. In the laboratory the approach is often inductive. You are asked to make various observations and draw conclusions from those observations that lead to general principles or physical models. For the Phys 118 labs, all you need to arrive at those conclusions will be available in the lab. You are asked to base your conclusions on your observations only. Instead of looking through a text to find the solution to a problem, you are asked to make observations that can lead, with logical reasoning, to answers. Physics is ultimately an experimental science. The theories or models developed to describe physical phenomena must agree with observations or must be modified or abandoned if they do not.

The extent to which observations can be said to support a theory is determined by how well those observations are made. The lab is an ideal place in which to confront the issue of measurement accuracy and its role in describing whether measurements do or do not support a particular theory. Our belief in a theory or physical model depends on the accuracy and reliability of the measurements that support it.

The lab offers an opportunity to learn about the tools of physical measurement, from simple instruments to measure length to quite sophisticated computer-based data acquisition systems. Above all, it can provide you with an opportunity to experience the process by which physical theories are developed and tested and help you to develop a better understanding of the validity of those theories.

Laboratory Manual

The Laboratory Manual for Physics 118 must be purchased at the UW Bookstore. Students are required to purchase the Laboratory Manual **before** their first laboratory session. It should be available by Monday, June 22.

HELPFUL HINTS:

- Your insight into the lab will be improved if you read the material in the text referenced above before coming to lab.
- For all labs, you are expected to learn from your observations. Your TA will confirm your solutions rather than supply them. At the beginning of the lab period, your TA may, at most, give a brief description of special features of the lab and lab equipment. If you are taking 115 concurrently, lectures will occur four times per week in the lecture halls.
- Physics concepts will sometimes appear in laboratory **BEFORE** you see them in lecture. The most important of these will eventually show up in lecture, homework and exams. *Concentrate in the laboratory on observing and understanding the phenomena.* You will get practice on quantitative problem solving in your lecture homework.

Lab Reports

You are required to submit your lab report for grading at the conclusion of each lab period. **Labs may not be taken from the room**. Your TA will initial the report to verify the work done. **Reports without initials will not be accepted.**

The lab instruction sheets contain spaces in which the answers to questions posed in the lab are to be written. **In all cases these answers are to be written in complete sentences!** A simple "Yes" or "Same" or similar one-word answers are not considered to be complete sentences.

Measurements should be made carefully and recorded with attention to the appropriate number of digits. If a length of approximately 12 cm is measured to the nearest millimeter, the result should be written with a digit in the 0.1 cm place. For example, if the measurement gives a length 3 millimeters longer than 12 cm., it should be written as 12.3 cm. If it gives 12 centimeters to within 0.1 centimeter, it should be written 12.0 cm. Written in this way, the number indicates that the measurement was made to the nearest millimeter. It is said to have three *significant figures*. All your measurements must be written with the appropriate number of significant figures.

You must submit a separate lab write-up even though you will be working with another student. Partners are expected to discuss their answers with one another and should agree on the measurements and try to agree on the answers to all questions.

Lab Maintenance

For the smooth functioning of the lab, it is **imperative** that equipment be returned to the lab bench arranged properly. A picture showing the location of the equipment and an equipment list will be at your lab station. Check the equipment at the start of the lab. If anything is missing or broken ask your TA for a replacement. Do NOT take equipment from another lab station. When you and your partner have finished a lab, call the TA to your lab station. The TA will initial your report **IF and only IF** all equipment is back in place. *Food is not allowed in the lab. Drinks are OK.*

Labs at Other Than Your Regularly Scheduled Sessions

If, for medical reasons or for unavoidable scheduling conflicts, you are unable to attend your scheduled lab section, you may request permission to attend another lab section **during the same week**. Permission must be obtained from your section TA *as well as* the TA for the section you wish to attend [**or** as a last resort, from the lab instructor.] Reports completed in other than your regular session must be turned in at the end of the session and *may be graded either by the TA of that session or your regular TA, at the option of the TA of the session you attended*. If you complete a lab in a section that is not your own, it is especially important that you provide all the information required at the top of the report, otherwise there is a real risk that the report will be lost.

Make-up Lab

If you miss a lab and cannot attend another section the week the lab is offered, there is ONE universal make-up lab scheduled in the last week of the quarter. It will replace the missing ONE of the other 7 labs. There is NO provision for any additional make-ups. Like any other lab, the make-up lab must be done completely during the universal make-up lab session. **DO NOT** bring a completed or partially completed report into a make-up session. This is cheating and will be reported as such.

It is especially important for make-up labs (either done in the same week or the universal make-up at the end) that the TA (1) marks that you are present and (2) initials your lab report when it is completed. Lab reports that are not initialed, or from students not marked present at the make-up session, will not receive credit.

Grading

Graded lab reports will be returned to you either on exit or one week after the lab is completed. You can and should check the status of your lab reports on line through the WebAssign homework system. If your score has not been recorded by the return date, ask your TA about it. Missing reports and missing scores do happen and should be dealt with as soon as possible during the quarter. If you do not receive a satisfactory response from your TA, contact the course instructor (Prof. Pedigo) within two weeks of completing the lab.

TO RECEIVE CREDIT FOR PHYS 118 YOU MUST:

(1) **Submit initialed reports for ALL 7 labs.**

(2) **Receive a passing grade on each of the 7 labs.**

If you complete fewer than 7 labs, you will receive no credit (NC) for PHYS 118.

Your TA will be encouraged to look over and perhaps grade your report before you leave each lab session **if time permits**. This will allow the TA to notice common errors that would obviously cause you to fail the lab, and to arrange for you to redo the erroneous work. So there is an advantage to those who finish early: they may have an opportunity to correct their work before the session ends. Reports that are judged unacceptable after the lab session is over will be returned to you along with a list of work to be completed in order to receive credit. This may vary from a simple recalculation of some values all the way up to a “fail”, which will require that you attend the make-up session. Reports judged acceptable will be returned with credit indicated.

Because credit is required for all 7 labs, and each is judged **pass or fail**, TA’s generally enter a “1” for credit as a score for each lab in the WebAssign system. You should expect to see a “1” entered in WebAssign for each of the 7 labs by the end of the quarter. Your TA may wish to grade your reports on a different scale, such as 0 through 5, so that you can have additional feedback on each lab as to how you are doing relative to others in the course. In any case, if you feel the need for additional feedback about how you are doing, ask your TA.

Lab Grades on WebAssign

All grades for the Physics 118 laboratories will be entered by your TA and will be available on the WebAssign homework system. This summer is our first use of this system, so be prepared for a few hiccups. However, you should still expect to see your grades posted in a timely fashion.

Physics 118 is a Credit/No-Credit course, so the lab grades will be entered on WebAssign as 0 or 1.

Check your scores on WebAssign regularly. This is the record by which you will be awarded credit for the course. Mistakes caught early are usually easy to correct, whereas those caught after several weeks have elapsed may not be correctable at all.

TA’s will have entered your scores by Friday of the week following the week in which a lab was completed.

Final Words

Of course, the main goal here is that each student learns some physics and develops a better understanding of the way the universe works. The big picture can sometimes be lost when blindly following a procedure you do not understand. It may help if you regularly ask yourself “What am I supposed to learn by doing this particular task?” When no answer presents itself, consult your lab partner(s) or your TA.

Despite all the rules it is possible to enjoy your PHYS 118 lab experience. We hope you do!