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Physics 2419 Workshop

Introduction

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WORKSHOP GOALS AND PHILOSOPHY

Physics is an experimental science. Experiments are performed to test the predictions of theories or to present data the theories cannot explain in order to spur better theories.

If you find physics difficult, you are not alone. The concepts are often not easy to grasp. We must each construct our own models of understanding. Passive listening to lectures and rote memorization are not good ways to learn. We must be able to assimilate the concepts and apply them to predict further phenomena. Studies have shown that learning improves when a student thinks about a concept or problem by him/herself first and then discusses it with a small group of peers. That is the philosophy we will follow in this workshop. The abilities to work within a group of peers and to communicate ideas, both orally and in writing, are important skills to have. These are fundamental goals of this workshop.

Most of the experiments in this workshop will utilize data sensors interfaced to a computer. We utilize PASCO's Data Studio software, because of its powerful ability to take, present, and analyze data. You will find most of the analysis tools you need in Data Studio. You can find the area, highlight a particular region, find averages, or a host of other things with Data Studio. You will find that you will normally be able to fit or model data with an analytic function. We will also make frequent use of Excel.

PURPOSE OF THE COURSE

The purpose of this workshop is to

- Teach you some important physical phenomena and concepts,
- Introduce you to proper laboratory procedures, to use computers and data sensors, and teach you some basic laboratory techniques,
- Give you confidence in your ability to take measurements and adequately analyze and interpret data,
- Teach you better oral and written communication skills,
- Teach you to think for yourself and to work in groups of peers.

REGISTRATION

Physics 2419 is a dependent course for Physics 1425, but it is not part of Physics 1425. It is a one-credit course with an independent grade. You must, however, be registered in a 1425 (lecture) section before SIS will allow you to register for a 2419 (workshop) section.

During the first week (the week of July 14, 2014), you must attend the section of your choice on time. If you are registered for that section, your place in that section is secure. If you do not attend or are late to your registered section, your name will be dropped from that sections enrollment.

Let us re-emphasize this point: If you are registered for a section and wish to secure your place in that section, you must attend that section on time during the first full week of classes.

After students registered for a section (who showed up on time!) have been added to the roster, those who wish to add to that section will then be added if space is available. Preference will be given to waitlisted students. Since only 24 students may be in any given section, if more students want to add than there is space available, names will be drawn at random and added to the roster until the 24 spaces are filled. The remaining students must find other sections to attend. Note, however, that there are normally two sections being held simultaneously so that most time slots have space available for 48 students in the two sections.

In the extraordinary event that you cannot attend any sections during that first full week of classes (say due to major illness or a family emergency), please contact Dr. Bychkov as soon as possible, but absolutely before your scheduled section. Contact Dr. Bychkov regarding any problems with registration.

It is your responsibility to be registered for a workshop. If you are unable to find a workshop open that meets your schedule, go to a suitable section the first week to see if space becomes available or to see if someone will switch with you. You may need to go to several workshops before this is successful.

COURSE ORGANIZATION

Every student must purchase the manual for Physics 2419 at the UVa bookstore. This manual contains the laboratory activities which you will use each week. You will be assessed a 10% penalty each week if you fail to bring your manual to lab.

Your work in Physics 2419 will consist of three parts:

1. A pre-lab homework that you must complete no later than 10 minutes before coming to the lab.
2. The lab itself, answering all the questions and predictions, and attaching data, results, graphs, and analysis as requested with your group members that will be turned in at the end of the lab.
3. A post-lab quiz that you must finish by 5 AM the morning following your lab meeting. The pre-lab homework and post-lab quiz will be done on the WebAssign Internet site.

The labs meet during each full week of classes and are overseen by a graduate teaching assistant (commonly called a TA). The TAs responsibilities are to ensure the safety of the students, protect the equipment, provide good teaching pedagogy to help you learn as much as possible, provide additional instructions and information concerning the lab, grade your work and, together with the faculty, assign your grade.

GRADING POLICY

The 2419 workshop will be graded as follows:

- The pre-lab homework is worth 20%.
- The weekly lab is worth 40%. Your grade is based on your performance and results in the laboratory.
- The post-lab quiz is worth 40%.

No scores will be dropped. Lab scores will be curved based on the performance of the entire class but will take into account possible different TA grading scales. Final grades are determined by relative class rank, not by a predefined numerical scale. Historically, the average grade in 2419 has been between B and B+.

PREPARATION BEFORE THE LAB

Before attending your lab section during the first full week of classes, look over the lab manual and become familiar with the appendices to which you should refer as needed throughout the semester. Particularly important is Appendix C: The Accuracy of Measurements and Significant Figures. Refer to Appendix C and apply it appropriately throughout the semester.

We are requiring you to spend time preparing for the lab each week. We expect that since you are better prepared, the lab will be a better learning experience.

In order to prepare for the lab each week, do the following:

1. Read over the lab write-up in this manual (including the relevant appendices) to get an overview of the material.
2. Read the instructions again, but this time more carefully; highlighting the important features of the lab. Try to work through any derivations you do not understand (refer to your textbook as needed). In other words, be an active reader and study the manual.
3. For each lab, you must do the pre-lab homework that can be found on the **WebAssign** Internet site:

<https://www.webassign.net/uva/login.html>

Log in using your university computing ID and password. Complete the pre-lab homework no later than 10 minutes before your lab meets. Note that some questions clearly marked as **pre-lab** in the Manual may not be part of the WebAssign pre-lab. However you are responsible for completion of such assignments ahead of time as well. The pre-labs are not pledged and you are encouraged to work together to understand and solve the problems. However, you are responsible for really knowing how to work out the problems. Simply plugging numbers into a formula or spreadsheet given to you will teach you nothing.

PROCEDURE IN THE LAB

Normally you will work in groups of three. You will be assigned to a different group each week. We encourage a free exchange of ideas between group members (and also generally in the laboratory), and we expect you to share both in taking data and in operating the computer

system. Your TA will deduct points from your lab grade if you are not participating in the experiment.

The lab report consists of answers to the questions and predictions written in the lab Manual. You will tear out the corresponding pages of the Manual and hand it to your TA. You are not allowed to write in your lab manual before the lab, except for the predictions that were requested in the pre-lab homework or in the lab manual. You must not answer any of the questions in the lab manual before the lab period.

At the end of the period you will turn in the data collected in the lab as a group. However, each student will turn in an individual copy of the answers to the questions and predictions. Everyone must fill out the material asked for in the manual, but only turn in one set of graphs and data when you are asked to print them out. Be sure that all such printouts are well noted with the activity number and your lab partners names. You and your group members will not receive a common grade for the lab each week, because we will grade both your results and your answers. Each lab is **1 hour and 50 minutes** long. You are expected to have vacated the room within 1 hour and 55 minutes to allow the next section to begin on time. For reports turned in late, TAs will impose a penalty of 1 point for every minute after 1 hour and 55 minutes.

AFTER THE LAB

You are expected to clean up your work place after you finished the lab. Please leave the tables in similar or better conditions than you found them. Repeated offenders of this policy will receive a penalty on their reports.

After attending each lab section you must do the post-lab quiz that can, again, be found on the **WebAssign** Internet site:

<https://www.webassign.net/uva/login.html>

Log in using your university computing ID and password. The post-lab quiz is a timed and pledged assignment. Therefore you may need to review corresponding materials before you begin taking the quiz. The post-lab quiz is due by 5 AM the morning following your lab meeting. You are allowed to use your notes, books and lab manuals but are not allowed to use external help. Automatic extensions are available (see WebAssign Policy section below).

TARDINESS

Late arrival for any lab session is very disruptive and will be penalized. After an initial five minute grace period, the TA will deduct 10% from your grade for the first ten minutes of tardiness and 20% for each successive 10-minute period (or part thereof). If you are more than 30 minutes late you will not be allowed to take the lab.

ABSENCES AND LAB MAKE-UPS SCHEDULING

Summer sessions are very intense. With 3 labs per week there is no scheduled make-ups for any missed lab. In extreme cases such as **incapacitating** illness you will have to contact the course instructor, Dr. Maxim Bychkov mab3ed@virginia.edu, explaining your situation.

The make-ups are not guaranteed. All make-ups will be decided on case by case basis.

If, for any reason, you are unable to keep up with assigned work, you are expected to withdraw from the course. Excessive absences (more than 2) will require notes from a doctor or medical professional.

WEBASSIGN POLICY

Large portion of your work in this class will be performed via the WebAssign interface. Therefore we felt it is important to dedicate a separate section to explaining WebAssign policies.

Please pay close attention to the due dates of the WebAssign pre-lab and post-lab assignments. The pre-lab homework will always be posted on Tuesday of the week before the regularly scheduled lab. **The homework is due 10 minutes before the lab** (and no extension other than that described below in this section will be granted).

You will be given 10 submissions to obtain the correct answer. Before the dead line, no time limit is imposed on the pre-lab assignment. The WebAssign will indicate if you answered a question correctly after each submission. However, do not waste your submissions. Seek assistance if you are having difficulty. Remember, the pre-lab homework is NOT pledged. Indeed, you are encouraged to work together. As noted earlier, though, you are expected to learn how to do the problem, not just work a calculator.

Work all your calculations out to several significant figures, at least 6. Submit your answer to WebAssign with at least 4 significant figures. Never round off any of your given numerical values or any intermediate values. Ignore the fact that you may be given a number accurate to only 2 significant figures. Assume it is 10 figures. WebAssign allows only a small error, therefore in chain calculations, an acceptable answer on an earlier part may not result in an acceptable answer in later calculations.

The post-lab quiz IS pledged and timed. You are allowed to use your book, notes, and manual (available in PDF form via the class website), but you are NOT allowed to consult anyone or use results from any previous years.

The post-lab quiz will be posted right after the lab (at the next hour mark). **The post-lab is due by 5 AM of the day after you perform the lab.** The post-lab quizzes have a time limit of 50 minutes. This is an absolute deadline and if you do not submit the quiz on time, you will receive a grave penalty. Do NOT aim for the deadline.

You will be given 3 submissions for the post-lab quiz to allow you to submit your work and to reduce the temptation to wait until the last second to hit Submit. Unlike the pre-lab homework, you will not be told whether the answer is correct when you submit the post-lab quiz. WebAssign always grades your last submission, so you must leave your answers in WebAssign after each submission. Do not wait until the last second to submit your answers or you may receive a zero. **Despite our warnings this will happen to several students during the semester, and they will receive a zero.**

Make sure that you not only *Save* but *Submit* your answers. The saved answers are not graded and are not stored by the WebAssign past the time limit of the quiz. You will receive a grade of

zero for the questions you did not submit. **Despite our warnings this will happen to several students during the semester, and they will receive a zero.**

Once the post-lab quiz is started the time limit can not be changed, stopped or extended. Therefore, **never** begin your post-lab quiz if you think there is the slightest chance that you will lose electrical power, or your internet connection e.g. from a thunderstorm. **Do not attempt** to "sneak a peak" at the post-lab that you missed, after the deadline. Once you clicked on the post-lab the clock will start running. As a rule of thumb, it is best not to click on the post-lab assignments in case there is any doubt. **Despite our warnings this will happen to several students during the semester, and they will receive a zero.**

There is also an option for asking for an **automatic extension** in WebAssign if you miss the due date for the post-lab quiz. Every post-lab will have an associated link, following which the extension can be requested. You must request the automatic extension within 22 hours of the due date. If you accept the extension, 30% will be deducted from your quiz score, and you must complete the quiz within a window of 2 hours that begins when you accept the extension. (The time limit is still imposed so you must start the quiz within 1 hour, 10 minutes.)

Please note this statement from the WebAssign manual concerning the Time Remaining clock on WebAssign:

The first time a student clicks a timed assignment, the Java applet countdown timer will show the number of minutes and seconds left for submitting the assignment. Java must be enabled in the students browser to see the countdown timer. Pop up window will warn the student when there are 5 minutes, 2 minutes, and 1 minute left. The students countdown timer runs independently from Web Assigns clock. If a student opens another browser window, the clock may no longer be accurate.

CLASS POLICY

Although we strive to discuss most situations encountered in the class in this Introduction, the class policy might change throughout the semester in some ways. In such cases the change of rules will be emailed to all students. A class website (also mirrored on the UVa Collab site) will also include the policy changes.