

Syllabus for PHY 166 and 167 Lab – Fall 2019

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Office hours: By appointment. (Talk to me during the labs!)

Attendance and Grading

Attendance is mandatory for all labs and recitations. Missing more than one lab and one recitations results in an F for the course.

At the end of each lab session, both the student and the instructor sign the obtained experimental data. The student makes a photo of this page and includes it at the end of the lab report as a proof that the lab was done by the student.

Labs can be made up within one week of the originally scheduled lab day, and only for valid, documented reasons. You should contact me in advance for permission to arrange a make-up lab.

Grades are based on your lab reports, which have to be uploaded to Blackboard by the end of the day of the following lab. Labs are graded out of 10. Tutorial and recitations are graded based on your attendance. This class gives you maximum 20 points out of total 100 for the course.

How to succeed

1. **Attend** and complete all labs.
2. **Prepare** *before* coming to lab. Reading through the manual beforehand will help you feel more comfortable and confident while carrying out your experiment.
3. **Listen to the instructor's** introductions. The manual is still far from perfect, and the instructor will show how to do better on the blackboard in the class. Make photos of this with your phones and use them in the preparation of the reports.
4. **Upload assignments in on time**
5. **Avoid plagiarism.** Although the experimental data are collected in teams, lab reports have to be written individually. If you are giving your report to another student for copying, you risk to be accused of plagiarism.
6. **Report has to be well readable** for a general reader. Always look at what you are writing and try to assess if a reader (not the instructor!) is able to understand it.
7. **Don't lose points!**
 - a. To extract the slope of straight lines, always use plotting-fitting software. Never try to find the slope using only two data points – this is an illegal method that nobody is officially teaching.
 - b. Take care of the units. In most cases, before substituting numerical values into the formula, convert them to SI: m, kg, s, etc. If there is a disagreement by a large factor, this is because of a unit error, not because of bad data.
 - c. Be critical to the results you obtain – always check if they are realistic. Do not show the attitude: “This is what comes out of the calculator and I don't care”.

How to write Lab Reports?

Lab reports should be typed in Microsoft Word (or a similar program), including tables and formulas (using the “Equation” menu under the “Insert” tab). Insert graphs generated by Excel (or a similar program) and photos of hand-drawn sketches etc. (if needed) into your report. Photocopies of parts of the manual (for instance, pages with filled data tables) are not accepted for reporting. However, copies of the data page signed by the student and by the instructor should be included as a proof at the end of the report.

Graphs must be computer generated. Construct graphs and tables using Microsoft Excel or another preferred computer program. Usually, data points on the graphs should not be connected by lines. If the slope of the graph has to be extracted, use the fitting function of Excel that finds the best straight line approximating the data. The fitting formula should be on the graph.

Proofread your reports before turning them in.

The structure of Lab Report approximately follows that of the Manual

To write a good report, read the detailed description of its structure below.

- **Name** of the student, name of the instructor, number of the lab, date, (clearly visible) weekday of lab classes.
- **Title** of the lab (in a large font). Cover page is not necessary.
- **Introduction:** General idea of the lab, planned experiments and comparisons, expected results, formulas to be used in calculations (very important!). Do not reproduce derivations and intermediate formulas from the manual.
- **Experimental data:** All raw data gathered during the experiment put into tables shown in the manual. In many cases, these tables can be extended to include the quantities you calculate. This will improve the structure and readability of the report. Suggestions will be made by the instructor on the blackboard. Make photos by your phones!
- **Calculations and Analysis:** As said above, it is usually advantageous to include some calculated values already into the data tables. In this section, make remaining calculations in free form. Always start with a short sentence describing what you are doing and the formula you are using. Do not produce computational part that consists of mere numbers. At the end of every line of your calculation, put the appropriate unit. Include plots, if needed. Calculate percent deviations from the accepted values or percent discrepancy between the results of different experiments. In some cases, uncertainties have to be calculated.
- **Conclusion:** Include the following: Do your results support the physical law being tested? What are the sources or error? Do not give light-minded answers such as “there were human errors”. Are there ways you could have improved your experimental results? Also, answer questions at the end of the lab description in the manual.

Additional suggestions to the structure of the report.

- Do not itemize your report according to the manual, such as “Question 1, Question 2”, etc. If you do so, it makes an impression that you are not creative and you are doing your job mechanically.

- If two experiments are being done, A and B, than the best structure is: Data A, Calculations A, Data B, Calculations B. If you use the sequence usually suggested in the manual: Data A, Data B, Calculations A, Calculations B, the material is poorly organized, incoherent, and difficult for the reader.
- The manual adopted the philosophy that there is always an accepted value. This is a completely wrong idea. Accepted values are the values that you can find online or in books: physical constants, material parameters. However, “the result of the experiment B” cannot be considered as an accepted value. Generally, the physical values can be experimental, theoretical, provided by the manufacturer.

Plagiarism

Plagiarism of any form will not be tolerated. This includes, but is not limited to, copying all or even part of another student’s lab report and copying from any text without properly quoting and citing your source. **Plagiarized work will result in a grade of zero for that lab.** In the case of work copied from another student, both students’ labs will receive a zero. Please, keep in mind, that, although all students in a team have the same experimental data, lab reports should be prepared independently. NEVER let other students copy your lab report, including computed numbers! You can find Lehman College’s official statement on academic integrity in the 2013-2015 Undergraduate Bulletin or online at <http://www.lehman.edu/undergraduate-bulletin/academicintegrity.htm>. Blackboard is checking submitted reports for plagiarism across its database for all years.

Blackboard

Upload your report as PDF or as a MS Word file (DOC or DOCX). Although Blackboard allows you to upload several files, it is always better to have everything in one file. There will be only one upload attempt for each lab given to a student. Please, upload lab reports exactly where they belong. Misplaced uploads will be deleted to avoid mess, and the student will have to reupload. Reports are due on Tuesday two weeks after the Tuesday lab. Thus, the Tuesday sections will have exactly two weeks for preparation and the Thursday sections will have two weeks minus two days. If you are unsure about your reports, ask your instructor. Do not submit in time at the expense of correctness. As a rule, no points will be taken off for late submissions. Points will be taken off if a student is late regularly or/and submits a bunch of reports at the very end of the semester.