

2014

# 142-02 Technical Physics Lab

Amy Bosch

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**Technical Physics Lab**  
**PHYS 142-02**  
**R 9:30-11:20; LND 203**

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Office Hours: Monday 9-10, Tuesday 12:15-1, Wednesday 10-11; Thursday 12:15-1. I am not on campus on Fridays.

**Student Learning Outcomes:** The goals of this laboratory course are to:

1. Supplement the lecture material, as well as learn topics not covered in the lecture.
2. Utilize analytical and quantitative skills to design experiments and test theories.
3. Practice presenting data in written form.

### **Lab Notebook**

Keeping a good record of what you do experimentally is a good habit to get into for any scientific endeavor. For this course you will need to have a composition notebook to record data. It should be dedicated to this lab only. Here you will record all the values measured in the experiments, as well answers to questions and other notes. Sketch any graphs you made, at least showing the axes and shape of the curve.

### **Lab Quizzes**

Each lab will start with a short quiz. This will cover both last week's lab, as well as pre-lab questions for this week's lab on the experiment you are about to do. Reading the handout and completing the pre-lab assignments will help you to prepare for the quiz, as well as reviewing last week's lab. Each quiz will take only a few minutes, and so if you arrive late you may miss it. Coming to class late or unprepared is unfair both to your partner and the other students in the class.

### **Lab Exams**

The lab exams will test your understanding of both the experiments and the theory underneath. Treat these like you would any other test. Make a study guide, and review the material carefully. The handouts and your lab reports should be your primary sources; a well written abstract is a very good study guide.

Some exams will allow you to use lab data in your notebook for part of the test, so be sure to bring this data with you. This will be limited to one fairly permanent notebook of reasonable size. You may not use the lab handouts themselves, nor your reports. You may paste graphs in your lab book.

### **Lab Reports**

Your lab report should tell a good story. This is not just about getting the right answers, it is about clearly expressing them in an organized, cohesive way. Your lab report should not be too long; a paragraph for the abstract, another for error sources, and data tables and calculations along the way usually suffice.

A report should **not** be a procedural list of what you did in order. While a procedure is a useful part of many reports, we will not use them in this class. Avoid use of phrases like “and then we.” It should also not include long discussion of the physics topics, devoid of reference to this particular experiment. You should not have multiple sentences with no mention of your experiment.

While first person is acceptable, avoid telling *your* story. You want to tell the story of the *experiment*. Explicit notes on the details of your experiment are great in the error sources, but the abstract should focus on the bigger picture of your experiment as a whole.

Lab reports should include good tables, which are easily readable. Many small tables can scatter your data and make comparisons difficult, so try to combine tables when possible. While you do not want your table to be too busy, you are usually better off putting more in than less. If there are numbers which are the same for every element in the table, put them above or below the table, rather than listing them many times. (Particularly if you only measured this value once.) Like almost every number, your table needs units. Put them in the heading for each row or column instead of listing for each variable, unless of course they are different for different values.

Near your table you need to explain where every number comes from. Many of these are simply measurements (i.e., we measured  $r$  with a ruler), while others will be calculations. A simple formula can suffice very well, but always be sure to indicate which values you are using.  $F=mg$  doesn't tell much if there are several masses in the experiment.

Combine multiple parts in the lab when appropriate, and avoid repeating. The reader does not want to wade through paragraphs of repetition. Do not cut and paste large sections of text; instead combine these parts or refer to earlier explanations.

You may want to highlight important results and numbers of your lab with **bold** or *italic* text. Also, feel free to use **color** in your reports. Color coding data can make it much easier to read, and this is easy to do since you will usually not be printing. Feel free to bring your lab report by ahead of time and I will look it over with you. I can easily point out subtle points, and make suggestions more easily in person than I can in written form. Come either at office hours or make an appointment. Please do so at least one day before the report is due.

Lab reports have definite due dates, usually the at lab time the next week. Lab reports turned in late will be penalized about one letter grade. **No reports will be accepted more than one week late; a zero will be given for the assignment.**

<b>Grading:</b>	Lab Quizzes	10%
	Lab Reports	60%
	Mid-Term Exam	15%
	Final Exam	15%

A = 93-100%   A- = 90-92%   B+ = 87-89%   B = 83-86%   B- = 80-82%   C+ = 77-79%,  
 C = 73-76%   C- = 70-72%   D+ = 67-69%   D = 60-66%   F = 0 – 59%

### **Laboratory Schedule**

<b><u>Date</u></b>	<b><u>Experiment</u></b>
Aug. 28	Introduction
Sept. 4	Motion and Graphs
Sept. 11	Acceleration due to Gravity
Sept. 18	Projectile Motion – Water Balloons
Sept. 25	Newton’s First Law
Oct. 2	Newton’s Second Law
Oct. 9	No Lab
<b>Oct. 16</b>	<b>Mid-Term Exam</b>
Oct. 23	Centripetal Force
Oct. 30	Pendulum
Nov. 6	Hooke’s Law
Nov. 13	Rotational Motion
Nov. 20	Density
Nov. 27	No Lab
Dec. 4	Electronics
<b>Dec. 11</b>	<b>FINAL EXAM</b>

**Courtesy:** Please leave your cell phones, i-Pods, etc. turned off during class. Food is not permitted in the lab.

The instructor reserves the right to alter this syllabus if circumstances dictate.