

2013

# 171 Explorations I

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## **PHYS 171 - Explorations I**

**Fall 2013**

**Instructor** Dr. Gregory Braun

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**Office Hours** Thursday 1:00-2:00 is my one drop-in office hour. I am also usually on campus and can be available at the following times, but not necessarily in my office. I ask you to schedule ahead of time, so I can make a point of being available. Other times are also possible.

Tuesday 11:30 to 3:00

Thursday from 11:30 to 1:00

before or after my 1-3pm WF labs.

This goals of this laboratory course are to

- A. supplement the lecture material, as well as learn topics not covered in the lecture.
- B. utilize analytical and quantitative skills to design experiments and test theories
- C. practice presenting data in written form.

**Grading:** midterm & Final 30% (goals A & B)

11 reports or post-lab assignments 60% (goals A, B & C)

pre-lab quizzes (10%)

**Grading Scale:** 87 B+ 77 C+

93 A 83 B 73 C 60 D

90 A- 80 B- 70 C-

**Both the point values and grading scale are subject to change.**

Motion  
Acceleration  
Due to  
Gravity<sub>R</sub>  
Projectile  
Motion

The  
Pendulum<sub>R</sub>  
Newton's  
Second Law<sub>R</sub>  
Centripetal  
Force  
Work &  
Energy  
Momentum  
& Impulse<sub>R</sub>  
Momentum in  
Two  
Dimensions  
Rotation<sub>R</sub>  
Density

<sub>R</sub> indicates a full lab report

### **Lab Book**

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 lab notebook to record data. This can be any sort of at least semi-permanent book you can write in. 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 after the first will start with a short quiz on both the prior lab and the experiment you are about to do. Reading the handout and completing the pre-lab assignments and post-lab questions will help. The handouts and your lab reports should be your primary sources; a well written abstract is a very good study guide.

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. These quizzes will evaluate how well you understand the experiments and the underlying physics content.

### **Midterm**

This will measure your general experimental lab technique, as well as your understanding of the experiments and physics. You will be allowed 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, consisting only of your handwritten notes.

### **Final**

For the lab final you will need to perform and analyze an experiment. This will not be something you have done, but will use some of the same techniques. You will work in pairs to complete the experiment, and then separate for analysis and to answer questions.

Because this test the experimental methodologies developed throughout the semester, it is somewhat difficult to

study for, by design. Rather, be sure you understand the experimental and analytical methods you use throughout the semester, as you do them. Do study the techniques used in each of the semester's labs in preparation.

## 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.

Most lab reports will be submitted through Blackboard under the Assignments tab. This should include your report, with all data and calculations, as well as any post-lab questions, all in one file. Most simple sketches, such as force diagrams, are easily created in most word processors. (If you do not have access to an adequate word processor, two great free ones can be downloaded from either LibreOffice or OpenOffice.)

Do remember to include uncertainty sources. These are not mistakes, but limitations to the precision of your results. Describe which you think are the most important.

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 evening of the next day. 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.**

### **Graded Reports**

Graded lab reports are available with comments on Blackboard. **You are required to look at graded reports, and points will be deducted if you do not do so.** Look at these comments so you do not make the same mistakes; as the semester progresses I will be less lenient with small errors in the lab reports. You look at graded reports by going to “grade details” where you submitted the report. Once you see the report you may need to click the “Grademark” tab at the top to see comments. You can download and print out graded reports if desired.

I will indicate any grammar and typographical mistakes I notice. Minor errors will not change your grade unless they distract from the reading of the report, but you should make every effort to write as well as possible. Structure of your writing will affect your grade, as writing logically helps you think logically.

If I say to you “I would do this...” it means just that, not that you should necessarily do the same. This is not a criticism, but a suggestion of another way to present. Often this is a style issue.