Contents

I. Schedule of Experiments - Fall 2008 ................................................................. 2
II. General Information .......................................................................................... 3
III. Uncertainty and Significant Figures ................................................................. 5
IV. Graphing ........................................................................................................... 8
V. Using LoggerPro .................................................................................................. 10
Experiment 1 Friction ............................................................................................ 15
Experiment 2 Falling in Air .................................................................................... 19
Experiment 3 Work-Energy Relations ................................................................. 24
Experiment 4 Oscillations ..................................................................................... 28
Experiment 5 Rolling Motion ................................................................................ 34
Experiment 6 Collisions in Two Dimensions ..................................................... 38
Experiment 7 The Gyroscope ............................................................................... 45
# Physics 111

## I. Schedule of Experiments - Fall 2008

<table>
<thead>
<tr>
<th>WEEK OF</th>
<th>EXPERIMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 25</td>
<td>1. Friction; First week of classes</td>
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<tr>
<td>Sep. 1</td>
<td>Report 1 due Friday; Labor Day break Mon.</td>
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<tr>
<td>Sep. 8</td>
<td>2. Falling in Air</td>
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<td>Sep. 15</td>
<td>Report 2 due Friday</td>
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<td>Sep. 22</td>
<td>3. Work-Energy Relations</td>
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<tr>
<td>Sep. 29</td>
<td>Report 3 due Friday</td>
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<tr>
<td>Oct. 6</td>
<td>4. Oscillations</td>
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<tr>
<td>Oct. 13</td>
<td>Report 4 due Friday; Fall break Mon.-Tues.</td>
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<td>Oct. 20</td>
<td>5. Rolling Motion</td>
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<td>Oct. 27</td>
<td>Report 5 due Friday</td>
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<tr>
<td>Nov. 3</td>
<td>6. Collisions in Two Dimensions</td>
</tr>
<tr>
<td>Nov. 10</td>
<td>Report 6 due Friday</td>
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<tr>
<td>Nov. 17</td>
<td>7. The Gyroscope</td>
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<tr>
<td>Nov. 24</td>
<td>Expt. 7, continued; Thanksgiving break Thur.-Fri.</td>
</tr>
<tr>
<td>Dec. 1</td>
<td>Report 7 due Friday; Last week of classes</td>
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Reports are due by 5 PM on the last day of the scheduled experiment period. Early submissions are always welcome, while late work will be penalized at the rate of 5 percentage points per day or fraction late. Reports will not be accepted more than 10 days after the due date or the first day of finals, whichever is earlier.
II. General Information

"The truth is, the science of Nature has been too long made only a work of the brain and the fancy. It is now high time that it should return to the plainness and soundness of observations on material and obvious things."

R. Hooke

LABORATORY OBJECTIVES

The laboratory work associated with Physics 111 has two principal goals: To give you hands-on experience with the phenomena and models you will study in class; To develop basic experimental and analytic skills that will be used throughout your career in the sciences or engineering.

The laboratory exercises that you will do here are not "experiments", in the sense of forays into the unknown designed and executed by an intrepid young scientist (you). Rather, they were chosen to illustrate physical phenomena, ingenious techniques or useful methods. They were not intended to be extremely precise, and your results will be far from exact. You will be evaluated on your understanding of the material and your approach to problems, not merely the precision of your results, and you should allocate your effort accordingly.

As one of the earliest laboratory courses in your career at Rice, PHYS 111 will emphasize very basic skills. You should develop the ability to carry out common laboratory procedures correctly and safely; To make measurements and report your results in physically meaningful form, including estimates of uncertainties where appropriate; To recognize when equipment or procedures are not working, and undertake logical corrective action. You will also have the opportunity to communicate your results in the form of short reports on each experiment. To see how these goals fit into the overall laboratory program at Rice, you can consult the overview of laboratory objectives at http://www.owlnet.rice.edu/~labgroup/.

LABORATORY ORGANIZATION

The experimental work is semi self-paced, in that you may work any time the laboratory room is open. Apparatus will be available and reports will be due according to the included schedule. Assistance will be available on request.

Each exercise will require 2-4 hours in lab to complete the measurements, plus additional time to prepare a report. You may work with one partner if you wish, but it is not required. In any case, each student is expected to be familiar with all phases of the experiment and to produce an independent report of the results.
Note that the amount of equipment is limited, in some instances to only one set, so it will be impossible for all students to undertake an experiment immediately before a deadline.

DATA TAKING

Once the apparatus is set up, you can start taking data. If at all possible, make a plot or do some other preliminary analysis of the data as you go along. This will very quickly tell you if the data are reasonable, if the parameters are being varied enough, and if the apparatus is working.

The apparatus you are using, although often relatively simple, is remarkably expensive. Please be gentle so that neither you nor the apparatus is damaged. Particularly delicate or hazardous operations are noted in the lab manual as they occur. Please heed the warnings. If a piece of equipment does malfunction, please tell the instructor so it can be tagged for repair. We usually have a spare with which you can finish the lab.

REPORTS

Your lab grade will be based on a written report which should include:

a) A few sentences stating what you measured and why.

b) A brief description of the procedures that you used. You may assume that the reader will be familiar with the apparatus.

c) Your data and analysis, including appropriate tables and graphs. Be sure your data include units, and that graphs are clearly labeled. It is not necessary to display arithmetic calculations.

d) A discussion of the results and a summary or conclusion(s), as appropriate.

The report should be clear and well organized, using complete grammatically correct sentences, but it need not be a big production. The objective is to write down the significant details of the experiment, the analysis and the conclusions. Three or four neatly written pages, including tables, will suffice for most of the experiments. An example of a good report can be found on the laboratory page of the course web site.

GRADES

The lab grade is based on the quality of the experimental work and the lab reports. The resulting score will be reported to the lecturer as your grade for the laboratory portion of PHYS 111.

Grading is a necessary evil but you should be aware that most students do reasonable work and get good scores. A good grade is not, therefore, the most valuable thing you can get from this part of the course.