

## Syllabus (PHY 113 Lab)

Physics 113 Laboratory

Spring 2011

Instructor: Dr. Igor Shovkovy

Week days: Thursdays

Time: 4:10 pm – 6:00 pm

Location: SANTN 102

**Purpose:** Testing is the cardinal principle in research. The laboratory gives the student the opportunity to test theories learned in lecture.

**Methods:** The laboratory consists of a series of experiments that allow the student to test the validity of theories learned in lecture. Students will conduct experiments, write up results and draw conclusions. Even though students will work in groups, **each student** will type an individual, unique lab report. Duplication of lab reports will not be allowed and all copies will receive a grade of zero.

**Grading:** See attached Grading Rubric. Unfortunately there is some subjectivity in grading these reports so the number of points awarded to you may not match someone else's. It is solely the prerogative of the instructor to award points.

**Grade Curve:** 90 and above – **A**, 80 to 89 – **B**, 70 to 79 – **C**, 60 to 69 – **D**, below 60 – **E**. This is a tentative curve and subject to revision.

**Office Hours:** Mon. 9:00 a.m. – 10:00 a.m., Wed. 9:00 a.m. – 10:00 a.m. Other hours will be available by appointment. Office: Wanner Hall 340J

**Attendance:** You will be expected to attend all scheduled meetings of your lab section. Attendance will be taken during each lab. You will be considered late if you enter more than 5 minutes after the scheduled start of the lab. If you are late more than 2 times without being excused you will be penalized by losing 2 **grade** points per occurrence.

There will be no makeup labs; instead the lowest lab score will be dropped. You are expected to complete labs with your assigned instructor. You may on occasion find it necessary to attend another section, but you will not permanently or on a regular basis, change lab sections without knowledge and written consent of the lab instructor involved. While some labs may be short, plan to

attend the full class time. Do not schedule any other classes or activities during this time.

**Reports:** It is expected that students will print the lab from blackboard **before** class. All lab reports submitted will be **typed** and no part except the questions will be copied from the lab handout. Copying anything else from a Blackboard Handout will result in a grade of zero for that report and be considered plagiarism. A short example of a lab in proper format is attached. Labs not in proper format will have points deducted as per attached rubric. The prelab questions for the lab to be accomplished that day must be done and handed in at the beginning of class in lieu of a coversheet. The prelab will be signed and dated by the instructor and returned. Signatures will be given out no earlier than 1 hr. after the beginning of class.

You have one week to write a report on a lab. Lab reports from the previous week will be submitted within 5 min. of the class' start time. Lab reports submitted later than this will be accepted at the discretion of the instructor and will result in loss of points. No report will be accepted without a signed coversheet.

Include all plots and graphs to support your calculations unless told otherwise. All graphs will be computer generated unless otherwise instructed. The graphs will be copied into Word, integrated into your report and placed immediately after the question that they were generated for. **Graphs will have labeled axes and titles and be large enough to read (1/3 page minimum).**

Numerical data will be presented in tabular (table) form and included in the appropriate place in the report unless instructed otherwise.

**Form:** The lab will consist of three parts: an adequate introduction, the numbered questions and answers and a general conclusion about the physical purpose of the lab. Labs will be turned in at the **beginning** of the next lab period.

### Introduction:

The introduction will answer the following questions: what equipment did you use, what did you do with it and how did you do it. Sufficient information should be given so that a reader might in general terms determine what you did in the lab.

### Answers:

Restate and answer all questions posed in the lab manual. Use the question numbers *from the lab handout*. Do not make up your own question numbers. Answers will be in complete sentences **including one word or number answers**.

Show all calculations. Calculations should be done where they are appropriate to the order of the questions and in space left for them in the body of the write-up. Merely stating a formula does not constitute a calculation. If more than one of the same type of calculation is done, give a sample calculation and present the results of all calculations in tabular form.

Include units with every numerical answer, table, graph etc. given. **You will lose points for not doing so.**

### Conclusion:

The general conclusion is **NOT** what you did in the lab. It is a general conclusion about the physical principles and theory tested in the lab. These principles may not always be obvious from the theory section. State the underlying principle of the lab in your conclusion. It is **NOT** a statement such as "the theory is valid." or a statement such as "I really learned a lot in this lab."

A general conclusion represents your **own** work and not copied from your lab partner or any other source. This applies to the answers to the questions as well.

**Disability Accommodations:** I am willing to make any reasonable accommodation for limitations due to any disability, however; the student must work through the student Disabilities Resource Center. Please see me to discuss any special needs you have.

**Academic Dishonesty Statement:** The College has the following position on Academic Dishonesty:

"All students assume as part of their obligation to the College the responsibility to exhibit in their academic performance the qualities of honesty and integrity. All forms of student dishonesty are subject to disciplinary action. They may include

but not be limited to: cheating, fabrication, facilitating academic dishonesty, and plagiarism.”

Committing any of the offenses above will be reported to the department chairperson.

**Cell phones, PDA's, laptops:** Set to “silent” and left in backpack, purse etc. unless a call is critical. Notify your instructor if you are expecting a critical call. **Cell phones are not to be used as calculators and no texting is allowed.**

## **Physics Laboratory General Safety Guidelines**

- 1) Notify your instructor immediately if you are pregnant, colorblind, allergic to any insects or chemicals, taking immunosuppressive drugs, or have any other medical conditions (such as diabetes or immunological defects) that may require special precautionary measures in the laboratory.
- 2) **The following apparel is mandatory for entry into the lab: sleeved shirts closed toed shoes and long pants.**
- 3) **Upon entering the laboratory, place all books, coats, purses, backpacks, etc in designated areas, not on the bench tops.**
- 4) Locate and, when appropriate, learn to use exits, fire extinguisher, fire blanket, chemical shower, eyewash, first aid kit, broken glass container, and cleanup materials for spills.
- 5) In case of fire, evacuate the room and assemble outside the building in your designated area.
- 6) **Do not eat, drink, smoke or apply cosmetics in the laboratory. Screw top beverage containers may be placed in a designated area. Take them out of the lab to drink from them**
- 7) Wear eye protection when told to by your instructor. You must furnish your own safety glasses.
- 8) Do not use equipment without instruction
- 9) **Report all spills and accidents to your instructor immediately.**
- 10) Do not allow any liquid to come into contact with electrical cords. Handle electrical connectors with dry hands. Do not attempt to disconnect electrical equipment that crackles, smokes or snaps.
- 11) **Do not pick up broken glassware with your hands.** Use a broom and dustpan and discard the glass in designated glass waste container: never discard with paper waste.
- 12) **Leave the laboratory clean and organized for the next group of students.**
- 13) The caution symbol points out instruments, substances and procedures that require special attention to safety.



- 14) Any bodily fluid is to be treated as a hazardous material. Do not attempt to clean it up yourself.

**A brief report example in the required format is shown below.**

**Introduction:**

This lab will test the theory of conservation of momentum in collisions in isolated systems. To do this, a computer that is running Datastudio will be connected to Pasco motion sensors at each end of 1.2 m track to measure the speeds of weighed carts. One light cart is pushed toward a more massive stationary cart (250gm. weights were added to a standard cart) with either Velcro bumpers (creating inelastic collisions) or magnetic bumpers (creating elastic collisions) at the ends of the carts that will collide. Velocity vs. Time graphs of the collisions will be made and from these the velocities of the carts may be determined both before and after collision. By knowing the masses of the carts and the speed of each pre and post collision, one can calculate the total momentum of the system before and after collision.

- 1) What are the masses of the carts before and after the elastic collision?

$m_2$ mass	
before	after
500g	500g

$m_1$ mass	
before	after
600g	600g

- 2) What are the velocities of the carts before and after the elastic collision?

(Here you would include a graph of the velocities of each cart.)

$m_2$ velocity	
before	after
0 m/s	3.3 m/s

$m_1$ velocity	
before	after
3 m/s	.27 m/s

- 3) Is momentum conserved in this collision?

$$m_1 v_{1i} = 3 \frac{m}{s} \times 0.6kg = 1.8N \cdot s \text{ (before)}$$

$$m_1 v_{1f} + m_2 v_{2f} = 0.6kg \times .27 \frac{m}{s} + 0.5kg \times 3.3 \frac{m}{s} = 1.81N \cdot s \text{ (after)}$$

The percent difference is:

$$\frac{2 \times |1.81 - 1.8|}{1.81 + 1.8} \times 100\% = 0.5\%$$

Momentum before and after collision is within experimental error and can be said to be conserved.

Repeat this experiment for an inelastic collision.

(Results from second collision should be shown here.) (Momentum is conserved)

**Conclusion:**

Total momentum is considered to be conserved in isolated systems if the momentum before and after collision is the same within allowable experimental limits. We have tested two types of collisions—elastic and inelastic—and found that total momentum is indeed conserved.

## Lab Report Grading Rubric

Each lab report will be worth 100 pts

No Lab report: 0 pts

Points will be deducted as follows:

**Late Labs:** Late labs will not be accepted

### **Prelab Page:**

- 1) Unsigned and undated prelab: lab accepted at instructor's discretion (up to **-10 pts**)
- 2) Incorrect answers to prelab questions or insufficient work shown: up to **-2 pts/question**
- 3) No answers to or skipped prelab questions: **-2 pts/question**
- 4) No prelab: **-10 pts**

**Form:** Lab does not follow form in the syllabus including using the proper question numbers etc.: **-5 pts**

### **Introduction:**

- 1) Introduction does not answer the following questions: What was done, how it was done and with what it was done. Any part missing: **-3 pts**
- 2) Introduction missing: **-5 pts**

### **Answers:**

- 1) Question skipped: **-3 pts to -10 pts** each occurrence
- 2) Answer does not follow proper form: **-2 pts to -5 pts** each occurrence
- 3) Answer wrong or outside error bounds (usually 10%): **-2 pts to -5 pts** per each
- 4) Answer contains insufficient information: **-2 pts to -5 pts** each occurrence
- 5) Answer does not have required calculations: **-2 pts to -8 pts** each occurrence
- 6) Required graphs or tables missing: **-2 pts to -8 pts** each occurrence
- 7) Instructions in lab handout not followed: **-5 pts** each occurrence
- 8) Units missing on answers, tables, graph, etc.: **-2 pts** each occurrence
- 9) No data taken, calculations made or shown at all: **-50 pts**

### **Conclusion:**

- 1) Conclusion is not a general deduction about underlying physical principle of lab: **-3 pts**
- 2) Conclusion contains information not substantiated by or within the scope of the experiment: **-3 pts** each occurrence
- 3) Conclusion contains information irrelevant to the lab: **-3 pts** each occurrence
- 4) Conclusion contains insufficient information: **-3 pts**
- 5) Conclusion off topic or missing: up to **-10 pts**

**A general rubric cannot cover every situation. The instructor is the sole judge as to the appropriateness of an answer and may deduct points for other reasons at his/her discretion.**

**All Class syllabi are tentative and subject to change as necessary to accommodate the needs of the class**

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Spring 2011

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*Location:* SANTN 102

I \_\_\_\_\_ have read, understand and have had any questions answered regarding the rules pertaining to this lab, and understand that they may change to accommodate changing circumstances.

\_\_\_\_\_  
Signature