

**Syllabus**  
**Physics 180L, Sections 1005 - 1006 – 1007**  
**Scientist and Engineering Physics Lab**  
**Spring 2012**

**General Information**

**Instructor:** Gunes Kaplan

**E-mail:** [newtonphysics@yahoo.com](mailto:newtonphysics@yahoo.com)

**Mailbox:** 2<sup>nd</sup> floor of Leifson Physics Building (not in the main office)

**Office:** LP 303

**Office Hours:** Monday 11 -12 pm (or by appointment)

**Lab times:** Th 8-10 AM (1005) / 10-12 AM (1006) / 1-3 PM (1007)

**Lab Director:** Dr. Bernhard Bach

**Lab manuals webpage:** <http://www.physics.unr.edu/LabsSpring.html>

**Course Description and Objectives**

The main purpose of this course is to provide students with experience in experimental physics. Students will have an opportunity to see the concepts and physical laws that are studied in the lecture by simple experiments and explore the fundamentals by performing experiments, collecting data and analyzing the results. Each lab section will start with a 15 minutes of short lecture introducing the main concepts and instructions about that day's experiment. **Please BE ON TIME for the lab!** Attendance and participation is required. Each student will work with a lab partner, and the final lab reports will be written in groups of two.

**Course Requirements**

**1. Lab Reports and Notebook**

- You are expected to print out and read the lab experiment before coming to lab. **Make sure you bring the print out copy to the lab** since your TA will not distribute it in the lecture.
- You must keep a permanently bound (not loose – leaf or spiral bound) lab notebook. Refer to the “How to Keep a Lab Notebook” page at the end for more information.
- The lab reports are due at the beginning of the lab period one week following the performance of the experiment. **Late reports will be marked down severely** (10 % off for each day after the first week).
- The reports may be written on any type of paper but must be neatly written, printed in ink, or typed (highly recommended). Please do not copy directly out of the book (**no plagiarism**).

- **Graphs must be submitted on graph paper** (hand drawn graphs are not accepted!).
- Lab reports for labs you did not attend will be given a zero, so make sure your TA signs you off at the end of the lab!
- Please follow the given format for the lab reports (next page).

## 2. Lab Etiquette and Attendance

- There will be 11 lab experiments during the semester. Only 10 of the 11 labs will be graded allowing the student to drop their lowest grade.
- You are expected to read the lab experiments before class and have a printed copy of the lab with you in the class. This will help you perform the experiment and can serve as your data sheet.
- Lab reports that contain copied or plagiarized material will be given a zero. Lab reports for labs the student did not perform will be given a zero
- You are required to attend all the labs.
- You are required to attend all the classes. If you must miss a lab due to an excused absence (illness, emergency or pre-arranged absence), you should arrange to make up the lab during a different lab session that week (the week of your absence). You should contact both instructors before attending another lab section. No more than two labs can be done in other lab sections.
- **By department rules, if you miss three or more classes you will receive a failing grade for the lab section. There is no way to make up the labs.**
- Lab reports that are turned in for experiments which you did not attend/perform will not be graded. You are expected to be to class on time.
- No more than two labs can be done in other lab sections.

## 3. Lab Safety

- Experimental work can expose one to various kinds of hazards (electric shock, burns, cuts...), every person working in the laboratory should be situational aware of their surroundings so as to avoid possible injury. Be aware and reduce the risk of injury and/or damaging the equipment. Report any accident immediately.

## 4. Lab Rules

- No eating or drinking in the lab (water is OK)
- If anything is broken, please inform TA immediately.
- If anything looks hazardous, please inform TA immediately.
- Make sure you turnoff all the equipment and disconnect all wires and cables before you leave the laboratory.
- Please keep the lab clean and equipment in working condition.
- Please turn off your cell phones during class.

## **Grading**

**90 – 100 = A / 80 – 89 = B / 70 – 79 = C / 60 – 69 = D / Below 60 = F**

## **Schedule**

Orientation | Normal Distribution  
Understanding Motion I & II | Freefall  
Force Table  
Acceleration on Air Track  
Scalar Product  
Conservation of Momentum  
Uniform Circular Motion  
Torque  
Rotational Kinetic Energy  
Standing Waves in Air  
Linear Harmonic Motion

## **Disability statement:**

The college will make reasonable accommodations for people with learning disabilities. Students can be tested or may already know about their learning disability. Please contact the Disability Resource Center in the Thomson Building Room 107. Please let me know within the first two weeks so we can arrange special accommodation for you. All discussions will remain confidential.

## Format and Grading Guidelines of Lab Reports

Name:  
Lab Partners Name:  
Lab Section:  
Date of Experiment:

**Title of the Experiment**  
(1 point for having a title)

### **Abstract (5 points):**

A concise statement (a paragraph or two) that summarizes the objective and states the numerical results of the experiment.

*1 point for having an abstract*  
*2 points for summarizing objectives*  
*2 points summarizing results*

### **Theory (10 points):**

Summarize in your own words, the theory of the physics involved in the experiment. Also present the working equations and the units. The theory sections should also outline the procedures used in the lab.

*5 points for having a theory section*  
*2 points for outlining procedures*  
*1 points for stating proper units*  
*1 points for expressing relevant equations*  
*1 points for defining relevant terms*

### **Data (8 points):**

An orderly display of the data, preferably in tabular form. You must including the original data sheet signed by the TA. All entries should be clearly identified and include their proper units.

*2 points for a data section*  
*2 points original data (signed by instructor)*  
*2 points for proper/clear labeling of data*  
*2 points for proper units of data*

### **Analysis (14 points):**

Must clearly show the computations used to reduce the data. First write the relevant equations then give a sample calculation. Be sure to include proper units and use the correct number of significant figures.

*2 points for having a computation section*  
*2 points for displaying relevant formula*

*2 points for sample computation*  
*2 points for proper units*  
*2 points for significant figures*  
*Graphs: 2 points proper units*  
*2 points labeling axis*

**Results and conclusion (12 points):**

A brief summary of your results, stating the determined value or law, along with its numerical uncertainty. Use proper units and significant figures. For example:  
The experimental value for the acceleration of gravity “g” was found to be:

$$g = (9.8 \pm 0.2) \text{ m/s}^2$$

Frequently you will want to compare your result (F) with an accepted value (F<sub>o</sub>). A good quantity to compute in this case is the “percent discrepancy” or the “Percent error” which is defined as:

$$\text{Percent - Discrepancy} = \frac{|F - F_o|}{F_o} \times 100\%$$

If you are comparing two values of “F” found in different ways (F<sub>1</sub> and F<sub>2</sub>) you can find the “percent difference” given by:

$$\text{Percent - Difference} = \frac{|F_1 - F_2|}{F_M} \times 100\%$$

where F<sub>M</sub> is the mean of F<sub>1</sub> and F<sub>2</sub>.

Round off percent errors and differences to two significant figures. Discuss what you found and compare with what you had expected to find. Discuss any discrepancies. One may suggest ways in which to improve the experiment or reduce errors. Some labs may include questions, worth a total of 12 points.

*2 points for having a results section*  
*2 points stating determined value*  
*2 points for stating uncertainty*  
*2 points for having a discussion section*  
*2 points for summarizing experiment and results*  
*2 points for each question answered correctly*

**Lab= 50 points total**

**Grade = (total points earned / total point available) X 100**

**Note:** Your instructor will consider the above format important when grading your lab report. The following may be taken into consideration as well. (Worth  $\approx$  10%)

- Neatness
- Composition
- Grammar
- Spelling
- Thought and originality in performing and presenting the lab
- Behavior that is disruptive to the labs (which includes but not limited to: being late to class, not leaving a clean work area for the following class...)

## How to Keep a Lab Notebook

A lab notebook is the way real scientists keep track of their work. It may seem tedious or even unnecessary to you, but it is an important part of any lab experience. Ideally the notebook should be complete enough that you could refer back to it in a few years and repeat the experiments. For the purposes of this lab, your notebook should be complete enough that you could write a detailed lab report several weeks or months after performing the experiments.

### General Guidelines:

1. The notebook must be permanently bound: no loose-leaf or spiral notebooks.
2. Handwriting must be legible. All notes should be taken in pen (with the exception of colored drawings that may be done with pencils). Errors should be crossed through with a single line, not erased or obliterated.
3. All information in the notebook must be handwritten or represent actual results, such as photographs. Do not place any photocopied material into your notebook unless specifically directed to do so.
4. Everything you do in the laboratory should be recorded in your lab notebook, including lecture notes, data, calculations, drawings, speculations, etc. Everything from your initial strategy through planning, execution and interpretation should be in your notebook.
5. Keep all of your lab-related notes, including lab lecture notes, in your notebook. Keep a separate binder for the lab manuals and lab print-outs.
6. Keep in mind that your lab report will be prepared from the notebook. You should have much more information recorded in your notebook than you can or should put into your report.

Your notebook should include:

1. Reserve the first three pages for a **table of contents**.
2. **Pre-lab Section** to be done before coming to lab:
  - a. **Title** and **date** of the experiment:
  - b. The **Objective(s)** of the lab.
  - c. The **Procedure** in flow chart or outline form. This should not be an exact copy of the lab manual instructions, but reworked in a manner easy for you to follow.
3. **Lab lecture notes**.
4. **Observations**: everything that happens during your experiment that may have a bearing on the outcome or interpretation of the experiment.
5. Any **deviations** from your written procedure, intentional or accidental.
6. **Data**: Raw and calculated. Use tables and graphs where appropriate. Show sample calculations with steps and units.
7. Answers to assigned questions.
8. **Discussions**: Interpret your results. Refer back to your predictions. Draw **conclusions** about the experiment. Make suggestions for further experiments or refinements to the procedure.
9. Anything else you will need to remember when writing your lab report.