

General Physics Laboratory I - Spring 2006

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Course Description and Objectives

The General Physics Laboratory is designed to give students a background in experimental techniques and to reinforce instruction in physical principles in the companion courses. Materials are chosen from both physical and biological sciences. These techniques and principles are quite general and applicable to aspects of all sciences.

This is a one-credit hour class that meets at least once a week for about three hours. Each meeting of the class focuses on a particular experiment described in the lab manual, *Laboratory Manual – Physics I*. Each experiment is designed to incorporate a new lesson on measurement, data, error, or graphical analysis in addition to illustrating a physical principle of the companion courses. The ordering of the experiments broadly follows the progress in the General Physics Lecture course 171.101.

Experiment descriptions in *Laboratory Manual – Physics I* are not meant to be recipes for performing an experiment, but guidelines. That is, goals for each project are normally spelled out, but decisions regarding the specific procedures to be followed to attain these goals often must be made by the student and his or her partner, under the guidance of the lab instructor.

Adequate preparation before class is therefore the key to success in the laboratory. This preparation has three components: *studying* the project description in the lab manual and the relevant sections in the companion course textbook (referenced in the project description); *doing the problems* in the lab manual and other problems assigned by the lab instructor; and bringing to class the problem solutions and a *concise write-up* of the objectives for the project and a tentative procedure to be followed.

Location: 165 Bloomberg Center, Room A.

Required Books:

1. *Laboratory Manual – General Physics Laboratory I*, Spring 2006 (available at Printing Services in Wyman Park Building)
2. *Lab Report Notebook I* Spring 2005 (available at Printing Services in Wyman Park Building)

Recommended Book:

1. *An Introduction to Error Analysis* by John R. Taylor (available at Bookstore)

Number of Experiments for the semester: 11

Web page: http://www.pha.jhu.edu/courses/2006_spring/173_111/

Course Policies

1. Each student, paired with a lab partner, is assigned to one section under the supervision of one lab instructor with lab hours occurring in one of the nine time periods each week. This assignment can be changed during the course of the semester by the lab instructor.
2. You are required to have read the required material and completed any problems associated with that experiment before coming to the lab.
3. The lab will be closed at 3:50 pm or 8:50 pm, depending upon the lab session. Before leaving the lab, make sure you know what experiment you will do next week and that you have the material necessary to prepare yourself. Please leave all the equipment in proper order before you leave the lab.
4. If there are any pre-lab problems for a lab, then they should be handed in at the beginning of the lab period.
5. Each experiment must be performed with your lab partner within the assigned section in the designated time period. *All activities of the experiment, data taking, analysis, and writing the lab report are to be completed during the three-hour period.*
6. Each student is required to write an individual lab report in the lab notebook, although the two lab partners may share the same data of measurements.
7. Your instructor must *sign and date with time* your lab report for that period before you leave.
8. The lab notebooks are *not* to be taken out of the General Physics Lab. They remain in Bloomberg 165 or in the instructor's office to be graded by the instructor.
9. The experiment for a particular week may not be in synchronization with the lecture part of General Physics. If the subject matter has not been covered by the lectures, the student should read the General Physics lecture class textbook to gain the necessary knowledge.
10. **Grading policy:** Each lab will be graded according to a four and half point scale:

Points	Description
4.5	Student's work exceeds expectations (something extra is added)
4.0	Student demonstrates mastery of material
3.0	Not perfect, but student mostly understands what he//she is doing
2.0	Student didn't understand some important things
1.0	Student demonstrates that he/she doesn't understand the material
0.0	Student did not show up or attempt anything

11. **Final grade:** 100% of the grade will be based upon the best 9 of 11 labs.
12. Each student must have an e-mail address to be given to your lab instructor. You *must* check your e-mail messages frequently to receive additional information about this course and your section.
13. Each student is responsible for performing all laboratory experiments at the scheduled times. In case of absence, the student may arrange with his or her lab instructor to make up a missed laboratory experiment. When possible, this make-up session is to be arranged in advance of the absence. An appointment with your lab instructor is required to do a make up lab at the end of the summer session.
14. Food and drinks are not allowed into the laboratory. No Lap-top or student's personal computers are allowed in the lab, unless it is used as assisting device for disabled students. Cell phones should be switched off when you enter the lab.
15. Registration for this course is handled by the Registrar's Office. If you want to add/drop or change sections please do not contact your instructor, professor or the laboratory staff. Please do not contact the physics department office for dropping/adding or section changes. They will not be able to help you.
16. Please see the lab supervisor Mr. Ramesh for more information about the lab instrumentation and any concerns about the lab instructor. Please do not approach the Physics Department's office for any issues related to the lab.

17. Any issues about the lab grading should be first discussed with your lab instructor. If you are not able to resolve it with you instructor, contact the Head TA. If you are still not satisfied, then you should contact your lab professor, Professor M. Swartz. The lab professor's decision is the final decision regarding lab grades. Please do not approach the Dean's Office or the Registrar's Office with issues related to grading of the lab. (*Head TA*: George Bruhn, *e-mail*: gbruhn@pha.jhu.edu *Professor*: Dr. M. Swartz. *e-mail*: morris@pha.jhu.edu)
18. Any student with a disability is urged to see the lab supervisor early in the semester to make necessary arrangements to support a successful learning experience. The student should also have an official letter from the office of disability services, which requests the special arrangement for that student.
19. If a student is registered in a particular section, the student should attend only that section. If the student does not attend that section and consistently attends a different section, the grades of the student will be docked by one full point at the end of the semester. (Once in a while a student is permitted to attend another section for making up a missed lab)

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. You may consult the associate dean of students and/or the chairman of the Ethics Board beforehand. See the guide on "Academic Ethics for Undergraduates" and the Ethics Board web site (<http://ethics.jhu.edu>) for more information.

General Physics Lab 173.111 Spring 2006 Meeting Calendar

Monday	Tuesday	Wednesday	Thursday	Friday
January 30 <i>First Day of Classes</i>	Jan 31	Feb 1 Introduction	Feb 2 Introduction	Feb 3
Feb 6	Feb 7	Feb 8 Experiment 1	Feb 9 Experiment 1	Feb 10
Feb 13	Sept 14	Sept 15 Experiment 2	Sept 16 Experiment 2	Sept 17
Feb 20	Feb 21	Feb 22 Experiment 3	Feb 23 Experiment 3	Feb 24
Feb 27	Feb 28	March 1 Experiment 4	Mar 2 Experiment 4	Mar 3
Mar 6	Mar 7	Mar 8 Experiment 5	Mar 9 Experiment 5	Mar 10
Mar 13	Mar 14	Mar 15 Experiment 6	Mar 16 Experiment 6	Mar 17
Mar 20 <i>Spring Break</i>	Mar 21 <i>Spring Break</i>	Mar 22 <i>Spring Break</i>	Mar 23 <i>Spring Break</i>	Mar 24 <i>Spring Break</i>
Mar 27	Mar 28	Mar 29 Experiment 8	Mar 20 Experiment 8	Mar 31
April 3	Apr 4	Apr 5 Experiment 9	Apr 6 Experiment 9	Apr 7
Apr 10	Apr 11	Apr 12 Experiment 7	Apr 13 Experiment 7	Apr 14
Apr 17	Apr 18	Apr 19 Experiment 10	Apr 20 Experiment 10	Apr 21
Apr 24	Apr 25	Apr 26 Experiment 11	Apr 27 Experiment 11	Apr 28
May 1	May 2	May 3	May 4	May 5 <i>Last Day of Classes</i>

General Physics Lab 173.111
Spring 2006 Experiment Schedule and Meeting Rooms

All the experiments will be set up in 165 Bloomberg – Room A.

Exp #	Experiment Title
	Introduction and a short lecture on error analysis (No experiment)
1	Measurements and Statistics
2	Projectile Motion
3	Newton's II Law – Air Track
4	Inertial and Gravitational Masses – Centripetal Force Apparatus
5	Momentum and Energy conservation – Collisions on Air Track
6	Speed of a Bullet
7	Rigid Body Rotation
8	Skeletal Musculature – Human Arm as a Lever
9	Simple Pendulum
10	Speed of Sound
11	Heat – Linear Expansion of Metals

GENERAL GUIDELINES FOR LAB WRITE-UPS

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Follow the instructions given in your Lab Report Notebook and the instructions provided by your lab instructor. The following information may assist you in presenting a good lab write-up.

Title Section:

This section should include the title of the lab, the date, your partner's name, and the lab bench number.

Data:

All data collected during the lab should be clearly presented in a table format when appropriate. Use Microsoft Excel to create the tables. Label the columns, and provide units and error estimates for all of your measurements. When appropriate, include graphs in this section (refer to the section on Experimental Fundamentals II in your lab manual). Consult the lab manual or follow the lab instructor's instructions, for printing out the table. If a table is printed out, cut it neatly and attach it to your lab notebook using scotch tape or glue.

Analysis and Conclusion:

This section describes your final results. Show the equations used to obtain the final information, and if required provide error analysis. Compare your experimental values to the expected results or standard values, when appropriate. This section should include descriptions explaining what the values mean in the context of the experiment. Only some labs may require an Analysis and/or Conclusion.

Questions:

Answer the questions to the point. Be brief and precise. Do not give generalized answers such as "human error" or "computer mistake." Answers should have a scientific explanation

Signature of Your Lab Instructor

Have your lab instructor sign your lab report, with the date and time of its completion.