

Basic Laboratory Physics for Science and Engineering

Course and Instructor Information

Course Name / Code : Experiments for College Physics / 202489020

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Prerequisites: College Physics is a co-requisite

Course Description and Objectives

Physical laboratory experiments are an essential complement to the study of physics and engineering. Most theoretical principles are confirmed or otherwise disputed by experimental work. On the other hand, experimental results are important basis for understanding the theoretical model of a physical system. It is therefore very important to take accurate measurements and to properly carry out experiments to avoid misleading results. In this course, you will learn how the experimental process works by learning how to obtain and analyze experimental results. You will also see the basic principles that you have learned in action, to see the physical reality behind the equations. Along the way you will learn to use the basic tools of experimental physics, from simple measuring devices such as a ruler, to sophisticated digital data acquisition systems. You will learn how physical theories are tested within the bounds of experimental uncertainties. By the end of the course you will have performed experiments and tested theories on the topics of mechanics, electricity and magnetism, and optics.

The course will last for 8 weeks with 4 lecture hours (4*45mins) per week. 7 different experiments will be carried out respectively each week. Each experiment is structured in two parts, a recitation and a lab with attendance required for both. A summary and discussion of this course will be presented in the last week. The 45-minute recitation lecture will introduce the physical principles that are to be demonstrated by the experiments in the lab sessions. The 135-minute lab sessions will require every group (2 persons per group) to perform the experiment. The remainder of the lab will be used to collect and analyze the data.

Required Materials

The following materials are required for the course.

- 1) *Introductory Physics Experiments for Undergraduates*, by Hao Fu and Esmond Agurgo Balfour, Science Press (Beijing), 2017.
- 2) A scientific calculator that has trigonometric, logarithmic, exponential and statistical functions.

General Information for the Labs

- 1) Being late is not allowed. Eating and drinking are not permitted in the labs. This is both for your safety and to prevent damage to the laboratory equipment.
- 2) You are responsible for reading and understanding the section in the manual on the scheduled experiment before coming to the lab class. Make sure that you understand the physical principles to be demonstrated and the general procedure for the experiment. The more prepared you are, the faster and easier the lab will go. Feel free to ask questions about the experiment at any time. A schedule of the experiments is listed below.
- 3) Before each lab session you will complete a pre-lab assignment.
- 4) Before starting the experiment, make sure that you understand the function and purpose of the equipment.
- 5) Students will work in groups of two with the following exceptions. If a class has an odd number of students, one group will have three people. If a piece of equipment fails and cannot be replaced, the members of that group will split up and join other groups. Under no circumstances should a group have more than three students.
- 6) Once you finish the experiments, if time permits, then you should try to complete the lab report before you leave the lab. Lab reports should be handed in within 3 days after the experiment is carried out.

Week	Lab Schedule
#1	Room 319: Young's Modulus
#2	Room 424: Spectrometer – measurement of grating constants
#3	Room 423: Michelson interferometer
#4	Room 321: Photoelectric effect
#5	Room 422: Hall effect
#6	Room 317: Oscilloscope – analysis the character of RC series circuit
#7	Room 318: Wheatstone bridge
#8	Room 320: Summary and discussion

Grades

The grade for each experiment consists of pre-lab assignments (20%), lab check-in and performance (30%) and lab reports (50%). The final grade is the average of 8 grades for 8 different experiments.

Grade cutoffs are chosen to be as fair as possible but ultimately the line has to be drawn somewhere and it has to be drawn straight. Once your final grade for the semester has been submitted to the Registrar it will not be changed unless there is a verifiable error in the grade book, such as a missing grade or a grade that was entered incorrectly.

Makeup Labs

Makeup labs are only given at the discretion of the instructor. If you miss labs and you have a valid reason for missing, then you will be allowed to makeup them. Valid reasons include illness (a doctor's note may be required), family emergency, or other events of similar importance.

Academic Integrity

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. The corresponding treatment would be carried out according to the University Policy.