

**Foundations of Electromagnetism and Optics****Laboratory General Information****I. Purpose**

In this laboratory course, you will see applications of many of the physics principles you will be learning about in the PH145 class lectures. You will verify physical laws (e.g., Kirchoff's rules and aspects of Faraday's law), measure some important physical quantities (e.g., the speed of light and the Earth's magnetic field), learn how to operate a variety of meters and instruments (e.g., oscilloscopes, ammeters, and voltmeters), and observe many interesting physical phenomena (e.g., the diffraction and interference of light). In many cases, your lab experience will help to solidify concepts from the class lectures; in other cases, it will supplement those concepts or introduce new ones.

**II. Lab Instructors**

Duncan Tate (Monday afternoons)

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Virginia Long (Tuesday afternoons)

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Office hours will be specified by the individual instructors.

**III. Laboratory Schedule**

There are ten scheduled labs this semester. Labs begin the week of Feb. 9th with the Speed of Light Lab, and will include an introduction to PH145 labs and a brief discussion of laser safety. There are three scheduled exams in PH145, and in two of the exam weeks, there will be no lab (i.e., the weeks of March 2nd and April 20th). Please see the "Laboratory Syllabus" for a detailed schedule.

**Note:** Each lab period is scheduled for two hours, fifty minutes. Although some labs may take less time, you should be prepared to stay for the full allotted time.

**IV. Laboratory Manual**

The PH145 laboratory manual is available for purchase at the Colby bookstore. Before each laboratory session, carefully read the guide for that week's experiment in the lab manual.

**V. Lab Notebooks**

You need to purchase (and bring to each lab) a bound lab notebook (preferably quad-ruled), which is available at the Colby bookstore. *Spiral-wired notebooks are not acceptable.* Instructions on what you should put in your notebook can be found near the front of the lab manual.

## VI. Advance Reading Questions (“Pre-labs”)

Before each lab, read the experiment guide in the lab manual, and answer the advance reading questions located at the end of the experiment guide. These questions are based on the material in the lab manual. Your answers to these questions must be handed in at the *beginning* of lab (they will not be accepted later in the period); they are worth 20% of your lab grade.

## VII. Computer Use

Experimental data will be analyzed using Microsoft Excel on Macintosh computers; however, unlike PH141/143, no direct data acquisition will be made with the Macs. Since PH141 (or PH143) is a prerequisite for PH145, we assume that you know how to manipulate data in Excel (if not, see your lab instructor).

## VIII. Group Work and Individual Work

The experiments in PH145 Lab are designed to be performed by groups of two (sometimes three) students. You are strongly encouraged to develop a good working relationship with your lab partner(s) and to help each other in acquiring good experimental skills (for example, learning how to build circuits properly). You should also feel free to discuss the relevant physics concepts with your lab partner(s); however, each student is solely responsible for understanding all aspects of any given experiment and for developing the skills necessary for performing each lab. The lab partners should switch roles throughout the experiment – no one person should have the task of making all the Excel plots or setting up all the circuits.

Lab partners will be assigned by the instructor at the start of the lab course.

## IX. Grading

See the lab manual for instructions on completing written lab reports, as well as for expectations regarding checkout labs.

Each of the ten labs is worth ten points. The advance reading questions are worth two points each time. In checkout labs, you will get eight points when you complete the checkout satisfactorily. The point distribution for written reports (which are worth eight points total) will be determined by the individual instructors; the written overview will be worth about three points out of the eight.

Written lab reports are due within 24 hours of the end of your lab session. If an emergency situation develops, talk to your instructor.

## X. Lab Attendance and Lab Make-Ups

**An unexcused absence from one laboratory session will result in a grade of 0 for that lab. An unexcused absence from two laboratory sessions will result in dismissal from the course.**

(**Note:** If you arrive so late that your lab partner(s) have started the experiment without you, it will be considered an unexcused absence.)

If you have an unavoidable conflict with your scheduled lab session and need to switch lab days, you must make arrangements (at least one week in advance) with both your regular instructor and the instructor of the section you wish to attend. *It should be noted that permission to switch lab sections may not necessarily be granted, particularly if the lab section is already full.* Except in truly extraordinary circumstances, missed laboratories must be made up during the same week that the lab was missed.