

PHYS 251-L Physics II LAB

Spring 2020

Dr. Johnny B. Holmes

CATALOG DESCRIPTION: PHYS 251-L Physics II LAB
Laboratory to accompany PHYS 251. Corequisite: enrollment in PHYS 251.

TEXT: Lab experiment instructions in pdf form are available below (page 3) under Schedule of Labs section. We encourage students to bring their mobile device to lab. Pc's will be available for those who do not have laptops or tablets.

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PREREQUISITES BY TOPIC:

1. Basic algebra, trigonometry, calculus (differentiation and integration)
2. Newton's Laws of Motion and Newton's Law of Gravity
3. Law of Conservation of Energy

GOALS:

This laboratory course supplements the lecture course, so it is designed to assist you in reaching the goals of PHYS 251. The additional goals of this course are:

1. To provide a hands-on experience with some of the properties of electricity and magnetism.
2. To test the models developed in PHYS 251 in the real-world environment of the laboratory, and to see how well the models work and to find their limitations.
3. To acquaint the student with lab techniques.
4. To show the limitations of experimental verification of scientific theories.

EXPERIMENTS:

1. Electric Field Simulations
2. *The Cathode Ray Tube (CRT)
3. Ohm's Law (2 weeks)
4. *RC Circuits (Resistor and Capacitor)
5. Magnetic Deflection
6. Induction
7. *Determination of e/m (the charge to mass of the electron)
8. The Oscilloscope
9. AC Circuits (2 weeks)

GRADING: Each of the 11 lab sessions will be worth up to 15 points based on your participation and an oral report at the end of the session (165 points max). Each of the three experiments marked with an * requires a written report worth up to 100 points (300 points max). This makes for a total of 465 points.

- A: Be present for all 11 lab sessions and accumulate at least 433 points: this means that all 11 oral reports are well done and the average of the 3 written reports is 93 or above.
- B: Be present for all 11 lab sessions and accumulate at least 409 points: this means that all 11 oral reports are well done and the average of the 3 written reports is 85 to 93.
- C: Be present for at least 10 lab sessions and accumulate at least 379 points.
- D: Be present for at least 9 lab sessions and accumulate at least 349 points.
- F: Anything less than the minimum requirements for a D.

The three written reports are due at the beginning of the lab period two weeks after the experiment is completed. There will be a penalty of 2 points per lecture class day for each day a written report is late. Any late reports will not be accepted after the last day of classes for the semester. For more information on the written reports see the guide at the bottom of the page.

Oral reports are worth 15 points maximum. **For a smooth report 14 points will normally be awarded.** For an especially good report, 15 points may be awarded. If you are late for a lab, points may be subtracted. If the group has to go back and check on something after the oral report begins, points may be subtracted. If at the end of the lab not all parts are completed, points will be subtracted. If the report is not smooth or if incorrect conclusions are drawn, points may be subtracted. If you are more than a couple minutes **late to lab, points will be subtracted** based on how late you are.

NOTE: Feel free to ask questions any time before you begin your formal oral report. No points will be subtracted for questions before you begin your formal oral report.

ABSENCES:

If you know you will miss a lab, you may make arrangements with the instructor before the lab to make the lab up at a later time. If you miss a lab without notice and wish to make up the lab, you may do so by the last regular class day of the semester, but there will be a 5 point penalty plus 2 points per lecture class day that you fail to make arrangements. There are three other lab sections for PHYS 251L, so if you need to miss a lab see if you can make it up in one of the other three sections that meet during the week – be sure to ask both me and the other instructor for permission if you wish to do this. As a last resort, there is a make-up day during the last week of classes.

SCHEDULE FOR LABS: (T=Tuesday)

	T	Jan. 7		none
1	T	Jan. 14		Electric Fields Simulations download Electric Field Simulation program from this page
	T	Jan. 21		None (MLK day week)
2	T	Jan. 28	*	* The Cathode Ray Tube
3	T	Feb. 4		Ohm's Law , Parts 1-3
4	T	Feb. 11		Ohm's Law , Parts 4-5
5	T	Feb. 18	*	* R-C Circuits
6	T	Feb. 25		Magnetic Deflection
	T	Mar. 3		<i>None - Spring Break</i>
7	T	Mar. 10		Electromagnetic Induction
8	T	Mar. 17	*	* Charge to Mass Ratio of the Election (e/m)
9	T	Mar. 24		The Oscilloscope
10	T	Mar. 31		AC Circuits Part 1
	T	Apr. 7		AC Circuits Part 2 & Part 3
11	T	Apr. 14		<i>none – Easter Monday week</i>
	T	Apr. 21		<i>Make-up date</i>

WRITTEN LAB REPORT GUIDE:

1. Each lab report should be printed using Word or something similar, or at least be clearly legible. Points will be subtracted for neatness if the report is hard to read or hard to follow. You may manually write in some things that are hard to do with the computer, such as sample calculations with units, or putting units on graphs.
2. Each written lab report should have the following, and provide a label for each part:
 - a. Title of experiment, student name, partner's name, date of experiment
 - b. Object of the experiment (one or two sentences). This may be taken from the report guide for the experiment.
 - c. Data - what you actually measure before calculations are performed- and **with units**. A **table** is often a good way of presenting your data.
 - d. Graphs where appropriate (with labels, **units**, and slope calculations if appropriate)
 - e. Calculations (including a statement of the equation and one sample calculation with **units** for each type of calculation)
 - f. Statement of results with appropriate comparisons, and include a discussion of the meaning of each graph. A **table** is often a very good way of presenting your results that make comparisons easy to see.
 - g. Discussion of errors or uncertainties and explain how they affect the accuracy of your results
3. Use correct English grammar and spelling.

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