

Tentative Syllabus for Physics Lab 251: Spring 2012
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During class periods, cell phones are to be switched off.

Office Hours

I will schedule several office hour blocks. I will be very close to my office during these times. Otherwise, I will usually be close to my office or research lab. If you want to find me outside of office hours, make an appointment so that you will be sure to find me. My schedule is located on the physics home page which you may review to determine office hours.

Grading

As a general guide to grades, grades will be assigned as follows:

100-90]	(90-80]	(80-70]	(70-60]	<(60
A	B	C	D	F

There are about 10 labs this semester (noting that lab 1 is in two parts and lab2 is a problem session): each lab provides 10 points in your final grade. The particular grade in each individual lab is awarded as follows: 70% of the grade (or 7 points) is awarded for successful completion of the lab. The other 30% (or 3 points) is awarded for submission of an acceptable report following the guidelines on the lab website. Each student team is to submit an individual and independent lab report for each experiment completed in order to obtain credit with each student in the team submitting an electronic lab report. You will have the opportunity during lab to respond to comments from the received electronic labs and then revise and resubmit your reports.

Note: If you miss one of the labs and it is not made up, your lab grade will be lowered by one letter grade for each missed lab which is not made up.

A portion of your lab grade from any particular experiment may come from oral answers to questions when you turn in your lab report or lab quizzes. Thus, it is important that you understand what you did during the lab before turning the lab report in to your professor. Your work on lab write-ups will be graded for correctness, clarity and completeness. **Failure to supply details leading to a result will result in very little credit for a lab.** If you want full credit for a lab, **you must** supply the logical steps that led to the result and the result **must include proper units.** You should supply sample calculations where appropriate. Diagrams and graphs should be included where appropriate. Aside from data tables and graphs, the components required for the proper lab write-up should take about 2 - 3 pages maximum for any given lab. Be sure that each lab starts with a cover page as indicated in the lab write-up guidelines. Make sure that your lab write-up is in the form of paragraphs with correct English grammar as indicated on the lab write-up guidelines. Failure to follow the guidelines will negatively impact your grade.

This course grade is completely separate from Phy220 and Phy250.

In this course, your grade will depend upon successful completion of lab experiments and reports. **You are also expected to have read the lab before coming to class.** You should bring your text, a calculator, and paper to lab. Labs will be completed and submitted during lab. In order to do this, you will need to come to lab on time. **You can not show up late for lab. Labs start at 13:00 promptly. Simply said, do not come late.** Making up the lab for such absences is normally not permitted: it is thus in your interest to show up to lab on time. Additionally, you should **never plan** other activities during the lab period since labs normally will occupy the entire period.

Lab report formats

If you miss a lab for an excused reason, you must make up the lab as soon as possible. If you hand in a lab report late for an unexcused reason, you will lose a minimum of 10% of your grade. Labs must be submitted in **pdf** format electronically. **When including spreadsheets in your reports, be sure to format tables so they fit on the page. I should be able to read your lab (as a single document in pdf format) without having to change anything. This means, check your pdfs before you send them to make sure you can read them.**

If you miss a lab for an excusable reason, you must make up the lab for credit. If you schedule a makeup lab and fail to show up for the makeup, no future makeup labs will be permitted. If you miss 3 or more labs (unexcused), you will fail the course. If you miss one of the labs and it is not made up, your lab grade will be lowered by one letter grade for each missed lab which is not made up.

Course Description

In this course you will be exposed to the experimental side of physics. Among the topics that we will investigate are mechanics, waves and thermodynamics.

Course Objectives

As a consequence of this course, you should obtain an enhanced understanding of the experimental nature of physics. In addition, you should come away from this course with an ability to interpret data in a scientifically valid manner and to have increased experience with writing brief technical reports.

Course Prerequisites

In order to be taking the physics lab, you must be currently enrolled in either physics 210 or physics 240 and therefore you must satisfy the prerequisites for those courses.

Text

The text will consist of handouts in electronic format obtained via the physics gateway at:

<http://www.compchem.org/~shutton/index.html>.

Attendance

The Lyon College Catalogue for 2011-2012 states:

Students are expected to attend all class periods for the courses in which they are enrolled. They are responsible for conferring with individual professors regarding any missed assignments. Faculty members are to notify the Registrar when a student misses the equivalent of one, two, three, and four weeks of class periods in a single course. Under this policy, there is no distinction between “excused” and “unexcused” absences. A reminder of the college’s attendance policy will be issued to the student at one week, a second reminder at two weeks, a warning at three weeks, and notification of administrative withdrawal and the assigning of an “F” grade at four weeks. Students who are administratively withdrawn from more than one course will be placed on probation or suspended (see Academic Probation and Academic Suspension).

Academic Honesty

It is expected and encouraged that students in this class will work together on labs as teams. The report will also be constructed (For FA11 only) as a team effort during lab and submitted by each student to the email account I provide you with. Each student must submit an individual copy (even though it may be a duplicate of your team effort). However, you may not submit the work of others outside your team as part of your report: to do so is a violation of the Lyon Honor Code. Thus, each lab should be pledged with the above provisions obeyed.

All graded work in this class is to be pledged in accordance with the Lyon College Honor Code.

“Students seeking reasonable accommodations based on documented learning disabilities must contact the Office of Academic Services at 307-7332.”

Tentative Schedule: R.1 for Physics 220 and Physics 250 and Physics 251 Spring 2012

labs	Worksheet Number	Date	220: Cutnell: 8 th ed. Assignment Reading : Homework	250: Serway 4 th ed Assignment: Reading: homework
	Worksheet 01: Electrostatics 1	W January 11	chapter 18	chapter 19
Lab01A: Electrostatics 1		F January 13	chapter 18	
	MLK Day: no class	M: January 16		
		W January 18	chapter 18	
Lab 01: Electrostatics	Worksheet 02: Electrostatics 2	F January 20	chapter 19	chapter 19
		M January 23	chapter 19	chapter 20
	Worksheet 03: Gauss' Law	W January 25	chapter 19	chapter 20
Lab 02: Lab Problems	Worksheet 03A: Problems	F January 27	chapter 19	
		M: January 30		
	Untest01	W February 01		
	Test #1	F: February 03		
Lab (03): Series and parallel RC	Worksheet 04: potential	M February 06	chapter 19	chapter 21
	Worksheet 05: capacitance	W February 08	chapter 19	chapter 21
	Worksheet 07: emf, RC circuit	F February 10	chapter 20	chapter 21
Lab (04) EMF and RC	Worksheet 08: Kirchoff's laws 1	M February 13	chapter 20	chapter 21
	Worksheet 09: Kirchoff's laws 2	W February 15	chapter 20	chapter 21
	Worksheet 06: Problems	F February 17	chapter 21	chapter 22
Lab05: current balance	Worksheet 10: Magnetic fields 1	M: February 20	chapter 21	chapter 22
	Worksheet 11: Magnetic fields 2	W February 22	chapter 22	chapter 23
	Worksheet 12: Ampere's law	F February 24	chapter 22	chapter 23
		M February 27		
Lab 06: magnetic Levitation	Untest02	W February 29		
	Test #2	F March 02		
	Spring Break	March 03 - March 11		
	Worksheet 13: Calculating B	M: March 12	chapter 22	chapter 23
Lab 07: solenoids	Worksheet 14: Faraday's law	W March 14	chapter 22	chapter 23
	Worksheet 15: Inductance	F March 16	chapter 23	chapter 23
	Worksheet 17: RLC Circuits 1	M March 19	chapter 23	Chapter 23
Lab 08: oscilloscopes	Worksheet 18: RLC Circuits 2	W March 21	chapter 23	chapter 24
	Worksheet 19: Thin Lens Eqtn 1	F: March 23	chapter 26	chapter 26
Lab 09: focal length	Worksheet 20: Thin Lens Eqtn 2	M: March 26	chapter 26	chapter 26
	Untest03	W March 28		
	Test #3	F March 30		
	Worksheet 21: Refraction	M April 02	chapter 26	chapter 25
	Worksheet 22: Mirror Eqtn	W: April 04	chapter 25	chapter 25
	Easter Vacation	April 06 - April 09		
	Worksheet 23: Multiple lenses	W: April 11	chapter 25	chapter 25
Lab 10: reflection	Geometrical Optics, Ray trace	F: April 13	chapter 25	chapter 27
	Worksheet 24: Thin films	M April 16	chapter 27	chapter 27
	Worksheet 25: interference	W April 18	chapter 27	chapter 28
	TEM Waves	F April 20	chapter 24	chapter 24
	Untest04	M April 23		
	Test #4	W April 25		
	Bohr Model/Last Day of Class	M April 27	chapter 30: 30.1 - 30.4	Chapter 29: 29.1, 29.2
	Final Exams	April 29 - May 01		

PHY 251 FUNDAMENTALS OF PHYSICS II LABORATORY / 1 credit. Experimental techniques for Fundamentals of Physics I. Corequisite: PHY 250.

General Education Objectives (proposed)

1. Students can apply critical thinking to pose and answer questions.
2. Students can use the processes and methods of science and mathematics to demonstrate how reproducible results give rise to the discovery of fundamental laws and the development of theories.
3. Students can articulate a basic knowledge of current scientific understanding of the universe and the scientific and mathematical laws that govern it.
4. Students can summarize, interpret, analyze, and critically evaluate data and reports relating to the natural sciences and mathematics.

A non-exhaustive list of intended learning outcomes follows

- (a) Perform simple experiments designed to complement class-room material.
- (b) Analyze data collected in a systematic manner and explore the compliance of this data with anticipated theoretical results.
- (c) Write a brief technical report covering the particular experiment at hand.
- (d) Ability to discuss with colleagues the physical system under study.
- (e) Develop an experiential-based method of inquiry leading to a scientifically creative individual.

At the present time, approximately 10 experiments are performed. The particular topics presented in the lab experience are essentially dictated by two factors: the pace of the associated course and the availability of lab equipment. The lab course, owing to the necessity and expense of having multiple setups is necessarily slowly evolving. Particular lab choices were determined firstly by availability of existing equipment (in the Spring of 2001) and secondly by the pace of the course. The present incarnation of the lab experiments is composed of the following experiments:

- (1) Electrostatics (covering charging methods and polarization).
- (2) Replaced by problem solving in electrostatics
- (3) Series and parallel resistances and capacitances.
- (4) Measurement of the EMF from a source and the time dependent RC circuit.
- (5) The current balance (magnetostatic field measurements).
- (6) Magnetic levitation (action of a ferromagnetic material when exposed to an external field. This lab also provides students with an understanding of magnetic domains, magnetization, and the meaning of magnetization).
- (7) Transformers.
- (8) Oscilloscopes (In the context of the application of an RC low-pass and high-pass filter, students are introduced to use of oscilloscopes and signal generators. The intention of this particular lab is to provide students with background into a very fundamental piece of research equipment found in almost any lab. Application of this to filter circuits provides students additional details regarding limiting frequency behavior of circuit elements).
- (9) Determination of index of refraction and the angle of refraction of materials.
- (10) Focal length of converging and diverging lenses and Brewster's angle.

Of these labs, presently 7 of the labs are interfaced (2,3,4,5,6,7,8) above.