Tentative Syllabus for Physics Lab 251: Spring 2014

Professor: Dr. Stuart Hutton
Office: Derby Center: 248 Research Lab: Derby 219: General Physics lab: 148
Phone: 870 307 7560
Email: stuart.hutton@lyon.edu
To access the Physics Gateway: http://hutton.lyon.edu

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

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 awarded contingent upon submission of an acceptable lab report. The other 30% (or 3 points) is awarded for submission of an acceptable report following the guidelines and rubric on the lab website. Note, however, that in the event that an acceptable lab report is not submitted, the lab is considered to not have been done and the final course grade will be lowered by 1 letter grade. 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 when experiments are done 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. The full lab, including writeup, must be completed or your grade will be reduced by one letter grade for each lab not fully completed.

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 3 - 5 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 or more of the labs without makeup, 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 electrostatics, magnetism, and optics.

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 220 or physics 250 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://hutton.lyon.edu**.

Attendance

The Lyon College Catalogue for 2013-2014 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 homework problems. If you use reference work, be sure to include proper references. On tests, students are required to keep notes and books closed except as instructed. Reference to material other than specifically permitted during a test is also considered to be an honor code violation. **Your professor will supply all the paper needed for the tests.** Any questions during tests should be directed to the professor only. **CELL PHONES AND OTHER WIRELESS OR NETWORKED DEVICES (INCLUDING COMPUTERS) MAY NOT BE USED DURING TESTS;** use of such devices during a test, is automatically be considered to be a violation of the Lyon College Honor Code.. **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 Dean of the Faculty at (870) 307-7332."

Withdrawal Deadlines

Last day to drop with no record of the course is 28 January 2014.
Last day to drop with a W is 24 March 2014.

Tentative Master Schedule: R.1 for Physics 220 and Physics 250 and Physics 251 Spring 2014

labs	Worksheet Number	Date	220: Cutnell: 8th ed. Assignment Reading : Homework	250:Serway 4th ed Assignment: Reading: homework
	Worksheet 01: Electrostatics 1	W January 14	chapter 18	chapter 19
Lab01A: Electrostatics 1		F January 16	chapter 18	chapter 19
	Martin Luther King Day (no class)	**M January 20**		
		W: January 22	chapter 18	chapter 19
Lab 01B: Electrostatics 2	**Worksheet 02: Electrostatics 2**	F January 24	chapter 19	chapter 19
		M January 27	chapter 19	chapter 20
	Worksheet 03: Gauss' Law	W January 29	chapter 19	chapter 20
Lab 02: In-Lab Problems	**Worksheet 03A: Problems**	F January 31	chapter 19	chapter 20
		M: February 03	chapter 19	chapter 20
	Untest01	**W February 05**		
LAB: TBA	**Test #1**	**F: February 07**		
	Worksheet 04: potential	M February 10	chapter 19	chapter 21
	Worksheet 05: capacitance	W February 12	chapter 20	chapter 21
Lab 03: Series and parallel R & C	**Worksheet 07: emf, RC circuit Note: WS06 occurs on Feb 15**	F February 14	chapter 20	chapter 21
	Worksheet 08: Kirchhoff's laws 1	M February 17	chapter 20	chapter 21
	Worksheet 09: Kirchhoff's laws 2	W February 19	chapter 21	chapter 22
Lab 04: EMF and RC Circuit	**Worksheet 06: Problems**	F February 21	chapter 21	chapter 22
	Worksheet 10: Magnetic fields 1	M: February 24	chapter 21	chapter 22
	Worksheet 11: Magnetic fields 2	W February 26	chapter 22	chapter 23
Lab05: current balance	**Worksheet 12: Ampere's law**	F February 28	chapter 22	chapter 23
	Worksheet 13: Calculating B	M March 03		
	Untest02	**W March 05**		
Lab 06: magnetic Levitation	**Test #2**	**F March 07**		
	Spring Break	**March 10 – March 14**		
	Worksheet 14: Faraday's law	M: March 17	chapter 22	chapter 23
	Worksheet 15: Inductance No ws16	W March 19	chapter 22	chapter 23
Lab 07: solenoids	**Worksheet 17: RLC Circuits 1**	F March 21	chapter 23	chapter 23
	Worksheet 18: RLC Circuits 2	M March 24	chapter 23	Chapter 23
	Worksheet 19: Thin Lens Eqtn. 1	W March 26	chapter 23	chapter 24
Lab 08: oscilloscopes	**Worksheet 20: Thin Lens Eqtn. 2**	F: March 28	chapter 26	chapter 26
	Worksheet 21: Refraction	M: March 31	chapter 26	chapter 25
	Untest03	**W: April 02**	chapter 26	chapter 26
Lab 09: Focal Lengths	**Test #3**	**F April 04**		
	Worksheet 22: Mirror Equation	M April 07	chapter 25	chapter 25
	Worksheet 23: Multiple lenses	W: April 09	chapter 25	chapter 25
Lab10: reflection	**Geometrical Optics, Ray trace**	F: April 11	chapter 25	chapter 27
	Worksheet 24: Thin films	M: April 14	chapter 27	chapter 27
	Worksheet 25: interference	W April 16	chapter 27	chapter 28
	Easter Vacation	**F:April 18 –M: April 21**		
	Untest04	**W: April 23**		
Lab: TBA	**Test #4**	**F April 25**		
	TEM Waves	M April 28	chapter 24	chapter 24
	Bohr Model	W April 30	chapter 30: 30.1 – 30.4	Chapter 29: 29.1, 29.2
Lab: TBA	**Last Day of Class**	F: May 02		
	Final Exams	**May 04 – May 09**		

CLASS SCHEDULE / OFFICE HOURS Spring 2014

Office		General Lab		Research Lab
Derby 248		Derby 148		Derby 219

PROFESSOR Stuart Hutton

Monday	Tuesday	Wednesday	Thursday	Friday
8:00-8:50 **PHY250.01** Fundamentals of Physics II **Derby 021**	**8:00-9:15**	**8:00-8:50** **PHY250.01** Fundamentals of Physics II **Derby 021**	**8:00-9:15**	**8:00-8:50** **PHY250.01** Fundamentals of Physics II **Derby 021**
9:00-9:50 **PHY220.01** Gen Physics II **Derby 021**	**9:30-10:45**	**9:00-9:50** **PHY220.01** Gen Physics II **Derby 021**	**9:30-10:45**	**9:00-9:50** **PHY220.01** Gen Physics II **Derby 021**
10:10-11:20 **Office Hours** Derby 248		**10:10-11:20** **Office Hours** Derby 248		**10:10-11:20** **Office Hours** Derby 248
11:20 - 12:00	**11:00-11:50** Faculty Assembly once each month	**11:20 - 12:00**	**11:00-11:50**	**11:20-12:00**
12:00 - 12:50	SGA 2 times per month	**12:00 - 12:50**		**12:00 - 12:50**
1:00-1:50	**1:00-2:15**	**1:00-1:50**	**1:00-3:50** **PHY251.01** Fund Physics II Lab **Derby 148**	**1:00-3:50** **PHY251.02** Fund Physics II Lab **Derby 148**
2:00-2:50	**2:30-3:45**	**2:00-2:50**		
3:00-4:15 **PHY382** Derby 011		**3:00-4:15** **PHY382** Derby 011		

Notes on the lab write-up for physics labs (Spring 2014)

Your first (cover) page should include the following information:
Your Name, Date, Partners, Title of Experiment and the abstract.
Each lab must be the unique written effort of the student team submitting the report. You may NOT reference or use lab reports (prepared by others, outside your team) in your report preparation.

Lab reports must be electronically submitted to the appropriate address as a single pdf document.

Title: Concise wording that describes the essence of the lab.

Abstract - a summary of your research including general methods and major conclusions. This is usually one paragraph long and should convince someone to read your paper.

Methods: - A brief discussion of experimental techniques. Diagrams are usually appropriate in this section.

Results -written usually in the past perfect tense or passive voice; describes your findings, data collected, and includes data tables, graphs, general trends, derived formulas, etc. All work and data tables must be shown here. In general, you need to have a copy of your original data with you but the data included in the lab report can be copied from your original data.

Discussion and analysis - tense can vary, describes your results in relation to other data, discusses problem associated with the lab, postulates trends in the data, predicts results given different circumstances, suggests sources of error, etc. **Be sure to include sample calculations in this section.**

Literature Cited - a list of books, articles, etc., that you used to assist you in presenting your data and which were referred to in the write-up. **When citing a reference from the internet, you MUST include the URL that points directly to the document so that a single click of the mouse will bring up that exact document. Every lab report will have at least 1 citation or the report will not be accepted.**

Your presentation of the lab is important. Be sure it is grammatically correct and neatly typed. Be careful of tense changes within a paragraph. Data collected during a lab must be authentic. "Fudging" is unacceptable and unnecessary.

Lab write-ups should be as **concise** as possible within these guidelines. I am not looking for exhaustive tomes of work in a lab write-up.

As an approximate guide to how points will be assigned for the written lab reports:

+0.5 points are obtained for a clear and correct abstract.
+0.5 points are obtained for clearly stated methods, using diagrams where appropriate.
+1 points is obtained for all results included (in readable form, of course).
+0.5 points are obtained for discussion and analysis.
+0.5 points are obtained for correct and relevant and authoritative literature references.

Total for the written portion of the lab is 3 points per lab.
The total for your lab work in a lab is 10 points thus 7 points will be provided by successful and careful attention to the mechanics of the lab itself.

PHY 251 FUNDAMENTALS OF PHYSICS II LABORATORY / 1 credit. Experimental techniques for Fundamentals of Physics II. 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 6 of the labs are interfaced (3,4,5,6,7,8) above.