

SYLLABUS
PHYS 276 - *Spring 2013*
Experimental Physics II: Electricity and Magnetism

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TEXTBOOK: **REQUIRED LAB MANUAL**
Physics 276 Laboratory Manual, Fall 2010 edition, Department of Physics, University of Maryland, College Park (Wiley Custom Learning Solutions, ISBN 978-0-470-92027-5).

RECOMMENDED REFERENCES

“A Practical Guide to Data Analysis for Physical Science Students” by Louis Lyons, Cambridge Press
“An Introduction to Error Analysis” by J. R. Taylor, University Science Books

LAB LOCATION: Rm 3120, Physics Building

LAB MEETING TIMES: Section 0201 Tuesday 1:00 – 4:50 PM
Section 0301 Thursday 2:00 – 5:50 PM

COURSE DESCRIPTION: Physics 276 is a 2-credit laboratory course for the physics major sequence dealing with electricity and magnetism and primarily electric circuits. It is the second course in the three semester introductory sequence. The prerequisites are PHYS 272, 275 and the associated mathematics courses.

COURSE POLICIES: Students are required to do all of the assigned experiments and complete a lab report for each. If you are not able to attend a scheduled lab section, make an arrangement in advance by writing to the teaching assistant (TA) and the instructor to get permission to attend another lab session in the same week. Only those with a valid written excuse for missing a lab will be considered. Students are responsible for notifying the instructor within the first two weeks of the semester about projected absences due to religious observances during the semester. If a missed lab cannot be made up in the same week, it must be made up during the make-up week at the end of the semester. Late arrival or making phone calls during the lab are not allowed.

COURSE REQUIREMENTS:

1. Experiments: Students are required to do all experiments and complete a lab report for each. Failure to do this will result in a failed grade for the course.
2. Spreadsheet: Students are required to submit a spreadsheet record of all that was done in the lab, including the raw data, questions, solutions, mysteries, discoveries, etc. The spreadsheet should be the Appendix of the lab report.

3. Lab Report: See the Laboratory Manual for the format of the reports. Lab reports should be completed in the lab and submitted as an MS Word or PDF file at the end of the lab period. The reports should be submitted electronically using the ELMS system (<http://elms.umd.edu/>). The lab report will automatically lose 10% of its maximum points per day for each day it is late. A missing lab report will cost one letter grade for the course. Missing a lab entirely and not making it up will result in failure of the course.
4. Pre-lab homework: Read the lab manual and prepare for the lab by writing a pre-lab report, including objectives of the experiment, list of equipment, procedure, expected results, references etc. in the same format as the lab report. Pre-lab reports are due the day before the lab meeting day. They should be submitted electronically using the ELMS system. Pre-lab reports are to be the basis of lab reports.
5. Presentation: Each student will give a short (~10 minute) oral presentation on one of the Experiments. You may be asked to present your experiment proposal based on your understanding of the manual at the beginning of the class. You may also be asked to present the experiment including results at the end of the lab.
6. Final Exam: The final exam will be based on material covered during the semester. Students are expected to take data following appropriate experimental procedures and explain the underlying physics. No makeup will be allowed for missing the final exam.

GRADE:

Pre-lab homework	10%
In class spreadsheet & lab report	60%
Presentation	10%
Final Exam	20%

LAB SCHEDULE:

Physics 276 Labs, Spring 2013 Tuesday & Thursday Physics Building, Rm 3120 (Lab)		
Dates	Exp. #	Experiment
Jan. 24	--	<i>No Labs</i>
Jan. 29 & 31		Introduction, Experimental uncertainties etc.
Feb. 5 & 7	0	Lab 0
Feb. 12 & 14	I	Ohm's Law
Feb. 19 & 21	II	Magnetic Fields due to Currents
Feb. 26 & 28	III	RC and LR Circuits with Stepped (DC) Input
Mar. 5 & 7	IV	RC Circuits with Sine (AC) Input
Mar. 12 & 14	Va	LRC Circuits and Resonance (sine wave)
Mar. 19 & 21		<i>SPRING BREAK</i>
Mar. 26 & 28	Vb	LRC Circuits and Resonance (square wave)
April 2 & 4	VI	Diode and Rectifier Circuits
April 9 & 11	VII	Transistors
Apr 16 & 18		<i>No labs</i>
April 23 & 25		Make-Up Week
April 30 & May 2		Final Exam

In case of Bad Weather: Winter in the Washington Metro area can bring large snowstorms that make travel dangerous. Should this happen and the University is closed as a result during a scheduled lab, class will be cancelled, and we will most likely reschedule the lab for the following week. Closing is announced over local radio/TV and the University's homepage: <http://www.umd.edu/>.

LAB MANAGERS: Mr. Allen Monroe
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Additional Tips:

Science research involves writing a proposal, carrying out experiments, and publishing research papers. In a research proposal you propose an experiment to meet the science goal you want to achieve. You need to justify how the experiment will help understanding of the science you set for your research objective. While conducting experiments, scientists keep record of what they do, analogous to what you will practice with your lab notebook in the form of an excel spreadsheet. Specifically, the excel spreadsheet is to keep a record of what you did in the lab and to remind yourself of your findings. To communicate research findings, the results are published in science journals. No matter how great your discoveries, if they are not published no one else would know of your discoveries and the world will not be able to utilize them. You will practice this by writing lab reports. You should write down your findings in an effective and convincing manner to your peers. Tabulating the data and plotting graphs are the most effective way of presenting data. In addition to writing down your experimental settings, you must perform error analysis to convince people of the reproducibility and validity of the data. As writing a lab report is like writing a journal paper for a publication, doing pre-lab homework is like writing a proposal. Using the same format as the lab report, you will write what you plan to do in the lab. Your pre-lab text can be used for your lab report.

1. Instructions: Read the instructions carefully before you start, again when you are doing the experiment and before you finish to avoid leaving out significant sections.
2. Measurements: Make sure to use the right scale.
3. Tables: Re-tabulate the data properly in ascending or descending order. When you use Excel, make sure the cells are formatted to reflect the precision of the instrument. For example, 3.000 must not show up as 3.
4. Experimental settings: Write down the experimental settings next to your readings.
5. Graphs: Make sure to put in axis titles and error bars.
6. Error Analysis and Numerical Calculations
 - Quantities: Define quantities (such as A, B etc.) before you use them.
 - Systematic presentations: First manipulate the expressions algebraically. Then, write down the corresponding numerical values of the quantities in the equation. Do not substitute numbers into the equations directly. Finally calculate the answer, write it down and underline it.
7. Discussion: Think about the experiment, look at the orders of magnitude, ask yourself how you might improve the results. Put all thoughts/understanding on the paper.

ACADEMIC INTEGRITY: The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic

integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

DISABILITIES: Students with documented disability should contact Professor Seo at the beginning of the semester to discuss accommodations.

COPYRIGHT:

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DISCLAIMER: The instructor reserves the right to make minor changes to this syllabus to meet the specific needs of the class during the semester.