

PHYSICS 220BL - Electricity & Magnetism Laboratory Syllabus

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Office: Live Oak 1112, Phone 818-677-6152 . Office Hours: TR 14:45-15:30, W 13:00-13:45 or by Appointment

Course Description: This course is the second in the Physics 220 series of laboratory practices. This laboratory covers electricity, magnetism and basic circuits, both DC (Direct Current) and AC (Alternating Current). The students should consult their PHYS 220B or 226 textbook for matters dealing with theory. Note: The course is designed to be independent of the lecture courses PHYS 220B and PHYS 226.

Course Objective: To understand the role of experiments in the scientific method and how errors in measurements affect the results. To be able to analyze data.

General Education Requirements: This course, together with PHYS 220A, fulfills the Subject Exploration: Natural Sciences requirements of General Education. This course satisfies the following GE Student Learning Objectives (SLOs):

SLO 1: Demonstrate an understanding of basic knowledge, principles, & laws in the natural sciences.

SLO 2: Explain how the scientific method is used to obtain new data and advance knowledge.

SLO 3: Demonstrate an understanding of the logical foundations and boundaries of science.

SLO 5: Demonstrate competence in applying the methods of scientific inquiry.

The course SLOs are met by learning the role that errors play in measurement including how to measure these errors, and how they affect the results via propagation of errors. Understanding the importance of recording the conditions of the experiment, how the measurements were done, and what the measurements were. Learning how to analyze the data collected and using the results to prove or disprove a conjecture/theory. Understanding the role that experimentation plays in verifying the laws of nature and the significance of the scientific method.

Course Schedule: Please note experiments are done out of order at the end.

Week	Date	Activity/Experiment
1	8/31	Intro, Experiment 0: Graphical and Statistical Analysis (10 points)
2	9/7	Qz 1, Experiment 1: Discovering Ohm's Law
3	9/14	Qz 2, Experiment 2: Simple DC Circuits
4	9/21	Qz 3, Experiment 3: Electric Field Plotting
5	9/28	Qz 4, Experiment 4: Wheatstone Bridge
6	10/5	Qz 5, Experiment 5: The Slide Wire Potentiometer
7	10/12	Qz 6, Experiment 6: RC Circuit Discharge
8	10/19	Qz 7, Experiment 7: Electron Acceleration & Deflection by Electrostatic Fields
9	10/26	Qz 8, Experiment 8: Electron Orbit in Magnetic Field & e/m ratio
10	11/2	Qz 9, Experiment 9: Oscilloscope
13	11/9	Qz 10, Experiment 10: Simple AC Circuits Reactance & Impedance
14	11/16	Qz 11, Experiment 11: Simple AC Circuits Variance with Frequency
15	no lab	
16	11/30	Qz 12, Experiment 12: Measurement of Earth's Magnetic Field
16	12/7	Practical Assessment ***

Course Requirements and Methods of Evaluation:

1. Attendance and participation are **MANDATORY**. As per University Attendance Policy, students who miss the first week of class will lose the right to remain in the class and must **FORMALLY WITHDRAW** from the course themselves. Failure to do so, will result in a **WU (= "F" in GPA calculation)** grade for the course and/or be **ADMINISTRATIVELY WITHDRAWN** from the course by the Associate Dean.

2. Any **unexcused missed** labs after the first week will result in a score of **zero** for these labs. If excused, students are required to make it up in another lab.

3. Textbook - Physics 220BL Laboratory. Read the lab manual for the next experiment thoroughly before the lab. Buy yourself a dedicated 3-ring lab binder to keep notes & labs in. **The correct version is 7/20/2016.** If you have an old version, you are required to **check for changes** against one of your classmates' copy.

4. Work in groups of two. The names of all the members of a group need to be recorded along with your data. In the case that there is an odd number of students in the class, one group of three is permissible. Each member should keep a copy of the lab data.

5. Take data directly using a pen, NOT a pencil. After you have obtained the experiment's data, you may leave and complete any required calculations (that are not prerequisites for further parts of the same lab) outside of the lab. **Have your instructor initial your data before leaving the lab.** You should attach this signed data to your report. Photocopies are NOT permitted.

6. Each lab (except E0) is graded on a 20 point basis and shall consist of:

(a) 4 points : Pre Lab Quiz

(b) 6 points : Performing all measurements correctly and the data sheet(s)

(c) 6 points : Data analysis including completed calculations, error analysis and graphs

(d) 4 points : Answers to questions

E0 has only parts a and b, so only 10 points.

7. There will be pre-lab quizzes that test students understanding of the upcoming laboratory. These quizzes are listed in the course schedule above and will be worth 4 points (see above).

8. Your lab report is due at the beginning of the next lab. Your report consists of (b) data sheet(s) with instructor initials, (c) analysis that was asked for (plots, calculations, etc), (d) answers to questions. The report must be hand written, except for computer printouts of graphs. Everyone must turn in their own report, even if you were working in teams. For grading purposes, your final report for the previous week's experiment must be turned in at the beginning of the next class. (Late reports turned in within 24 hours of the due date will lose 4 points from their total. No reports shall be accepted after that.) The report for the last lab is due before the practical assessment.

9. You must be punctual. If you are late, there will be penalties:

(a) Being late to lab (up to 15 min) lose 2 pts

(b) (15 to 30 min) lose 5 pts

(c) Do not show up if you are going to be more than 30 minutes late. It constitutes a missed lab.

10. *** There will be a **practical assessment** that is worth 60 points at the end of the semester (see date above). This consists of simple measurements or tasks that you should know from being actively involved in all the labs you will be performing.

11. If you have a question, ask your instructor. However, keep in mind that you will benefit from the lab in direct proportion to your efforts to think through problems and to solve them, hence try to solve it first.

12. Email policy: although you may receive a response before that, I am committed to responding to your emails within 36h, +24h per weekend day/holiday. Plan accordingly.

13. Grading Criteria:

The maximum score from the labs is 250 points, while the practical assessment is worth 50, that brings the maximum score for the course to 300 points. Grades will be based on the following:

A : 300 – 278, A- : 277 – 270

B+ : 269 – 262, B : 261 – 248, B- : 247 – 240

C+ : 239 – 232, C : 231 – 218, C- : 217 – 210

D+ : 209 – 202, D : 201 – 188, D- : 187 – 180

F : 179 – 0

14. Be safe and courteous. Unsafe and disruptive behavior may cause points to be deducted.

15. This is a 2.5 hr lab. Please do not expect to be here for less time. It is in your best interest to take your time, do the experiment well, and write up what you can before you leave.