Course:	152L, Section 008, Electricity & Magnetism (E&M), Spring 2018 **(Group 1)**
Lab Schedule:	Thursdays, 3:00pm – 5:50pm
TA:	Tom Thorpe
Email:	tnthorpe@hawaii.edu
Office:	WAT. 334
Office Hours:	Fridays, 8:00am -10:00am, WAT. 421
Text:	Harris, F.A., General Physics Laboratory II: Electricity & Magnetism Optics, 2nd Ed.

Preparation for the lab:

- Use one lab notebook.
- On the book's front cover print your name, class, section, and name of your TA. Also write table of contents at the beginning of each book, and have the pages numbered prior to use.
- Use a pen (black or blue) for all reports and quizzes.
- Read the lab instructions for the upcoming lab and bring the lab manual to class.
- Bring a scientific calculator and ruler.
- Wear close-toed shoes.

What to expect:

- The class will start most times with a 10-15min quiz, potentially followed by a quick discussion of the answers.
- This is followed by a 30-45min lecture from the TA. It is expected that the students interact a lot and ask questions. This will help to be more efficient when conducting the lab and writing the lab report.
- For the remaining ~2h the students will conduct the experiments and start the data analysis. Students should pay close attention to the instructions of the TA and the lab manual. Careful experimenting will result in better data. If something is unclear the TA is ready to help.
- A new random group partner will be assigned every two weeks.
- Nobody should leave without the TA signing your data.

Lab Notebook:

- Lab notebooks are for data, calculations, and notes. They are not graded.
- All data must be recorded, in pen, in your notebook. I will check and initial your data before you leave each lab.
- Your notebook should be kept such that your lab partner could use it to write their report.

Format of Report:

- **Report outlines will be given to you at the end of each lab and are due 1 week later.**
- **The following report structure is given for informational purposes:**

- Report Structure:
  - **Objectives**: The purpose of the lab. The objective part should be very short; it should not be longer than two or three lines. Write it in your own words.
  - **Notes**: Write and explain any derivations of formulas you used in this experiments as well as assumptions we made to modify these formulas. (these are not the lecture notes!)
  - **Procedure**: Write in your own words each step of your experiment. Do not copy the procedure from the lab manual. Draw a sketch of any apparatus and label the different components used in this experiment.
  - **Data input**: Will include tables, graphs (Before printing any graph ask your TA to check the plot), and charts properly labeled with units. Please tape all extra papers to your notebook. The data should contain the information that was given and measured during the experiment (radii, current, voltage, resistance, etc.).
  - **Calculations**: Transform your data into results. **Do not erase.** Write the formulas you are going to use in your calculation, explain what is that formula for, and then use it. Write **units** for all physical quantities. Not using units results in a deduction of points.
  - **Final Results**: Write all your final results as follows: result ± uncertainty. Every measurement that you take has to be given with an error. Giving a measurement without the uncertainty has no physical meaning.
  - **Discussion of errors**: Discuss the systematic and statistical errors involved in your experiment.
  - **Conclusion**: Write a conclusion in your own words. Explain whether the experiment fulfilled its objectives.
  - **Questions**: There will be questions following every lab.

Grades:

Lab reports:

- Each student is expected to perform all experiments. Please see the rules for make-up experiments below.
- The recorded data will be signed off by the TA. Data that was not signed off by the TA will not be accepted. Unsigned data tables will not be accepted in your report and potentially leads to 0points for the report (which is equivalent to missing one lab).
- Reports must be handed over to your TA at the beginning of each lab. (During or after lab will be considered as late). Working on previous lab reports in class is strictly prohibited.
- The lab reports make up 60% of the grade. If a lab report is not submitted the grade for the experiment is 0%.
- Penalties for late reports:
  - 1 week – 15% off
  - 2 weeks – The report will not be accepted → **results in one missed lab**

Quiz:

- A ten to fifteen minutes quiz will be given every time.
- It will contain about five questions from the current lab and the previous lab.
- Be prepared for those quizzes by reading the relevant chapters from your manual.
- The quizzes make up 40% of the grade.

Final grades will be curved over all sections. The typical outcome over all sections is approximately 25% A's, 40% B's, 35% C's and below. Every experiment carries the same weight for the grade calculation.

Cheating:

- No cheating and copying is allowed. This includes copying data from another student.
- The groups will collaborate to conduct the experiment and also to start the initial analysis. However, the final analysis at home has to be conduct individually.
- No collaboration for quizzes.
- A student who was caught cheating would be given a zero for that lab/quiz and report to the department for further discussion (may lead to a direct fail of the course).

Being late:

- This lab has a strict late policy. Missing parts of the lecture can potentially result in safety hazards and damaging behavior to the equipment.
- It is within the discretion of the TA to decide if a late student will be allowed to conduct the experiment or fail the experiment.
- Generally, being late by more than 30min automatically results in a missed experiment. This lab has to be made-up if the late arrival was excused with a reasonable explanation. Without a reasonable explanation the lab cannot be made up and the student receives 0% for the experiment.

Missed Labs:

- To receive full credit, a student must inform (email or call) his/her TA before or immediately after the missed lab. The student is responsible for arranging for a make-up experiment. The TA will assist the student with this process. The TA is not responsible for contacting the student after a missed lab to schedule a make-up experiment.
- If the TA was not contacted on the same day and the student cannot produce a doctor's note or any other evidence the lab cannot be made up. In this case, the student receives 0% for the experiment.
- A total of **two** make-up experiments is allowed. Any further misses, will result in failing the course. Special circumstances requiring to soften this rule should be brought to the attention of the TA as soon as possible and will be decided on a case-by-case basis. The lab will be either made up in the other section of the TA or with another TA.
- In case of scheduling conflicts, it is the student's responsibility to make time for the make-up experiment. It cannot be expected that the TA will conduct the experiment exclusively with the student on their own time. Special arrangements will be found for missing a lab in the last week of the semester.
- On a case-by-case basis, the TA will decide if she/he will provide a make-up quiz as well.

- Making-up of missed labs will be in the same week or by the following week. If a student is excused for a longer period special arrangements will be decided on a case-by-case basis. This should be brought to the attention of the TA as soon as possible.
- **Only one lab can be missed without making it up to be able to pass the class.** This will result in a 0% score for both quiz and report. A second lab that is missed and not made up (see rules for make-ups above) will result in failing the course.

Student learning outcomes:

- Better understand physics concepts covered in lecture by seeing their application in experiments.
- To understand the importance of experiment as the basis of the scientific method.
- To obtain experience in the techniques employed by scientists in all fields for analyzing data and drawing conclusions from "real world" experiments.

Lab Schedule by Week:

Week	Lab	Room
1/14	Intro/LED	PSB 111
1/21	Electric Field Mapping	PSB 111
1/28	Electric Deflection	PSB 112
2/4	Oscilloscope	PSB 111
2/11	DC circuits	PSB 112
2/18	Capacitors	PSB 111
2/25	Magnetic Field Mapping	PSB 111
3/4	Magnetic Deflection	PSB 112
3/11	Induction	PSB 111
3/18	Driven Oscillations	PSB 111
3/25	Natural Oscillations	PSB 112
4/1	Refraction of Light	PSB 111
4/8	Geometric Optics	PSB 112