

# Physics 152L – General Physics Laboratory II

## Sections 3 & 7: Group I

12:00-3:00 p.m. - Tu (sec 3), Th (sec 7)

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**TA:** Ryan Dorrill

**Email:** dorrill@hawaii.edu

**Office:** WAT # 329

**Office Hours:** Friday, 10:00 – 12:00, in Watanabe 421

**Class website:** <http://go.hawaii.edu/j5u>

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### **Aim for the course:**

- Obtain a deeper understanding of the laws of nature
- Gain an understanding of lab procedures and methods
- Discover the principles behind electronic devices, magnets, and lenses
- Improve students' ability to record and analyze data and perform error analysis
- Understand the importance of hypothesis testing and the scientific method

### **Safety:**

We will be dealing with electricity in this laboratory, so please carefully read the safety rules in the lab manual. In addition, remember to only make connections with wires when the power is off, and be aware of the setting on your ammeter / voltmeter. If you have any questions or concerns about safety during the lab, please notify the TA immediately. Also remember to wear closed shoes to protect yourself from accidents.

### **Required Materials:**

Physics 152L/272L Lab Manual, two **composition notebooks**, Scientific Calculator, Ruler, Scotch Tape, Scissors, and **Ink Pens**. Spiral notebooks and other types of notebooks will not be accepted. Further, points will be deducted if pencils are used to take data in lab or write the report.

### **Preparation:**

- Prepare for the lab in advance. Consult the lab schedule (updated version) for the schedule and read about the next lab before coming to class.
- Questions on the new lab may be included in the quiz before class
- Ask questions during lecture!
- After finishing the experiment, take a quick moment to check the data and make a few quick calculations. This will help you make sure you have recorded everything. Then, make sure the TA signs off on it.

### **Grading (in brief):**

Final Grading:

- Lab reports – 60% of the final grade
- Quizzes – 40% of the final grade

- Grades will be given on a curve, approximately: 25% A's, 40% B's, 35% C's and below
- All lab reports are due one week from the date the experiment was performed.
- Reports must be turned in at the beginning of class.
- Incomplete reports will be returned to you ungraded. If two or more reports are missed, you cannot pass the course.
- Short 10 minute quizzes will be given out each week at beginning of class. Don't be late!

### **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 30-45 min 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 in groups of two 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.
- Every lab is 2:50h long. You are expected to be on time and you are expected to stay until the end of the lab and to not leave early. If you finish early work on the lab report.
- A new random group partner will be assigned every two weeks.
- Nobody should leave without the TA signing your data tables.

### **Report Format:**

In general this is the format required for your reports. It may be different than the formats you have used previously. In addition, all lab work and data must be written in pen, not pencil, and use of white-out is not permitted. Mistakes can be crossed out, but should still be legible, because your notebook is meant to be an immutable record of your work. The only exception is the calculations, which may be worked out separately before being written neatly in your report. Point percentages are approximate and may be adjusted based on report quality or the current experiment being performed.

- Title, date, name, and name of lab partner, and Tab/Post-it: Please include your name, your lab partner's name, the date, and a post-it note to mark the page of each new report (only one post-it per book). Points will be taken off if these are left off.
- Hypotheses: Write a short paragraph (a few sentences) describing the objective of the experiment. In essence, this section describes what results you hope to find - results which should be falsifiable (~10%, 5 pts).
- Data: Tables, graphs, and charts. Charts must be neatly pasted or stapled into your notebooks (be neat and make sure to correctly fill in tables and label graphs and data with **units**). The report will not be graded without data). (~10%, 5 pts)
- Notes and Procedure: Briefly 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. (~10%, 5 pts)
- Calculations: Show at least a sample of your work for each type of nontrivial calculation or formula used (~10%, 5 points)

- Uncertainties: of the measured and evaluated quantities (~20%, 10 pts). This section should include sample calculations for uncertainties (uncertainty values must also be in the data).
- Results: Summarize all significant numerical results with their uncertainties and **units**. These are the results that fulfill the purpose stated for the lab (~10%, 5 pts). They should be listed neatly, **in a table**, with the uncertainties included.
- Discussion of Uncertainties : This is an important part of your report. Write a short list (3-6 bullet points) about any uncertainties encountered during the experiment, such as limitations of methods, reading uncertainties, difficult measurements, etc. This is not a discussion of “errors” or mistakes. (~10%, 5 pts)
- Hypothesis Testing (conclusion): Write a brief discussion (1 paragraph) of whether or not the experiment fulfilled its objectives. Specifically, whether the experimental value matches the theoretical value within uncertainty (~10%, 5 pts).
- Additional Questions: These are the questions at the end of the lab manual for each experiment. Sometimes, unique questions may be assigned in class as well. (~10%, 5 points)

Note: Written sections such as Hypothesis, Hypothesis Testing (Conclusion), and Discussion of Uncertainties should not be too long. Points will be deducted if they are.

### **Quizzes and Homework:**

You will be given a quiz each week at the beginning of class. The quizzes cover material from the previous lab and from the new labs, as well as error analysis and the required mathematics for the course. It is expected that you will have read ahead and reviewed the material to be covered before coming to class. Calculators are not allowed on the quizzes. Additional homework will also sometimes be assigned. Each homework will either count as a quiz grade or as points added to that week's lab report.

### **Grading: Further Info**

#### **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**

**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.

**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 must 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.

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**Cheating:**

- No cheating and copying is allowed. This includes copying data from another student. Groups will collaborate to conduct the experiment and also to start the initial analysis in the lab room together. However, the final analysis at home has to be conducted individually. A student who is caught cheating will be given a zero for that lab/quiz (may also lead to a direct fail of the course).

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**Lab Schedule by Week:**

## E&M

Group I starts in PSB 111

Group II starts in PSB 112

Week		Group 1	Group 2
1/15	1/19	Intro/LED	Intro/LED
1/22	1/26	Electric Field Mapping	Electric Deflection
1/29	2/2	Electric Deflection	Electric Field Mapping
2/5	2/9	Oscilloscope	DC circuit
2/12	2/16	DC circuit	Oscilloscope
2/19	2/23	Capacitors	Capacitors
2/26	3/2	Magnetic Field Mapping	Magnetic Deflection
3/5	3/9	Magnetic Deflection	Magnetic Field Mapping
3/12	3/16	Induction	Induction
3/19	3/23	Driven Oscillations	Natural Oscillations
4/2	4/6	Natural Oscillations	Driven Oscillations
4/9	4/13	Refraction of Light	Geometric Optics
4/16	4/20	Geometric Optics	Refraction of Light