

Syllabus

Course: PHYS 152, Section 06 Group II, E&M, Spring 2020
Lab Schedule: Thursday 9:00AM - 11:50AM
TA: Meg Foster
Email: mfooster3@hawaii.edu
Office: WAT421
Office Hours: Monday 8:00AM - 9:30AM & 1:00PM - 1:30PM
Website: <http://go.hawaii.edu/05G>
Text: The lab manual can be downloaded from the website listed above.

Student learning outcomes:

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

Preparation for the lab:

- Prepare a notebook:
 - On the book's front cover print your name, class, section, and name of your TA.
 - This book will be used to record the data.
- Use a pen for all data recording and quizzes.
- Read the lab instructions for the upcoming lab and bring the lab manual to class.
- Bring a scientific calculator, ruler, and tape.
- Wear closed shoes.

What to expect:

- Each student is expected to perform all experiments. Please see the rules for make-up experiments below.
- 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 ~30min 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 experimentation 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 signed data tables.

Lab report:

The idea of the report is that you could go back to report in a few months and would be able to repeat the measurements without any further instructions by only using your own report.

- Start with writing the experiment's title and your partners' name/s.
- List the date you are writing the report.
- Structure:
 - **General Notes to Keep in Mind**
 - Reference other sections, graphs, and tables by name.
 - Address any specific comments on your graded reports in future reports.
 - Do not give excess information. Be short and clear in the steps. However, use full sentences in your report. Do not just submit a list of abbreviate bullet items.
 - Write for a reader who wants to duplicate your results. Do not assume the reader is in the same room or in the same class.
 - Do not copy any text, graphics, or photos from the manual into your report. It has to be your own original work.
 - *Keep the objective in mind when writing **each** section.*
 - **Introduction**
 - Include your name, your experiment partner's name, and the date.
 - Include a title for the experiment.
 - **Objective**
 - State what you are trying to accomplish by performing this experiment and the methods or variations applied.
 - Needs to be written in complete sentences. For example,
 - The objective of this lab is to determine the effective length of a capacitor by mapping electric field lines for various configurations and potential differences.
 - **Theory**
 - Explain the important formulas and equations used in the experiment (number the ones you'll reference later). This section should motivate why and how we are doing this experiment.
 - Identify and describe the variables.
 - In your own words state how the objective will be fulfilled by the experiment.
 - Say what you want to measure directly and what those measurements will help you find.
 - Don't put error analysis equations in this section --these belong in the calculations section.
 - *Avoid plagiarism and write in your own words. Plagiarized sections will receive a zero.* I do not need to reread the lab manual, please just show that you understand why the physics discussed in the lecture portion are used in the lab and why.
 - **Procedure**
 - No bullet points. This section must be written in paragraph form.
 - State any calibration you did.
 - State what is going to be measured, with what instruments, and any

- techniques that you used to collect the data.
 - If you want to include a diagram or set-up figure, do so here. Label and number it. *All figures must be referenced.*
 - Note anything that went wrong with your setup and how you handled it.
 - Try to demonstrate your understanding of the theory section by explaining why some of the steps are done.
 - *Mention how the data will be used in order to achieve the objective.*
 - **Data**
 - Create tables containing all your measurements (no calculated quantities).
 - Use units that make the most sense for the experiment. Not everything needs to be converted to standard units.
 - Give your tables a small description underneath and a number.
 - Every column in the table should have a title that clearly identifies the measured quantity with its corresponding units. Make sure your uncertainties are reasonable.
 - **Graphs**
 - Make sure all axes have labels.
 - Make sure all axes have units.
 - Graphs titles should reflect the information presented, not just one axis vs. the other. Units are not typically necessary in a title.
 - Do your data points have errors or uncertainties? Add error bars.
 - *Don't forget that slope and y-intercepts have units.*
 - Don't post SciDAVis results without units or with unreasonable sig figs.
 - **Calculations**
 - Show all non-trivial calculations and walk the reader through your calculations. It is okay to show one calculation and then use a table to show the rest.
 - Show all error propagation calculations.
 - For the two previous bullet points, state the equation/formula you are using first in variable form, then with numbers plugged in, then your answer.
 - Sometimes the data you collected needs to be plugged into a formula, do that here, not in the data section.
 - Show calculations of how well your results agree with the theory (not all labs require this).
 - *Show calculation of how sure you are about the result. How do your errors/uncertainties impact this? (Discuss in the results section).*
 - Make sure all calculations have units.
 - **Results**
 - State measured results with uncertainties, units, and a leading zero if necessary. For example,
 - $a = 12.21 \text{ cm} \pm 0.11 \text{ cm}$
 - $a = (12.21 \pm 0.11) \times 10^3 \text{ cm}$
 - Make sure the number of digits is reasonable (use appropriate sig figs).
 - The number of digits passed the decimal point should be the same for your result *and* its uncertainty.

- State how well your results agree with theory.
 - State how confident you are in the results.
 - Discuss all significant systematic errors that occurred. State which of the four types of systematic error each one is (instrumental, environmental, observational, or theoretical).
 - Identify which of the systematic errors is largest *and how it affected your results*.
 - Give ways that systematic errors can be reduced or removed.
 - State whether the errors you listed agree with the error observed.
 - Do the errors you listed fully explain the error you measured?
 - Is your measured error too small for the errors you listed? How does this impact your “agreement” and “confidence”.
 - **Conclusion**
 - Restate your results.
 - *State the objective and briefly recap the experiment. Discuss if the objective was fulfilled.*
 - State in your own words how good the results were. Don’t forget how errors/uncertainties play a role in how good your results are.
 - State ways that the experiment could be improved if you had the opportunity to do it again immediately.
 - Explain what you learned from this experiment.
 - *No new information should be given in this section.*
 - **Appendix**
 - If you chose to type out your data tables or posted a grid in your data section, please put a picture of your signed lab notebook here.
 - **Questions**
 - The questions do not need to be answered specifically, but they are usually helpful and sometimes necessary to include in your conclusions or results.
- The recorded data will be signed off by the TA. Data not signed off by the TA will not be accepted. Unsigned data tables will not be accepted in your report and potentially leads to 0 points for the report (which is equivalent to missing one lab).
- Submission:
 - a. Reports have to be submitted on Laulima as a single **pdf** file. Typical test processing software should be used (word, libreoffice, google doc). The pdf file needs to be submitted before the deadline date (at the beginning of the next lab).
- 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:
 - up to 1 week – 15% off
 - after 2 weeks – The report will not be accepted → **results in one missed lab**
- I will occasionally send out a plot of the class grade distribution and return graded lab reports with current grades.
- Graded lab reports will be returned via google drive.

Quiz:

- The quiz will contain a couple questions from the current lab and the previous lab.
 - Common mistakes made in lab reports might also appear on quizzes.
 - Be prepared for those quizzes by reading the relevant chapters from your manual and taking notes during lab.
- The quizzes make up 40% of the grade.

Grading:

Final grades will be curved over all sections. The typical outcome over all sections is approximately 25% A, 40% B, 35% C 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 in the lab room together. However, the final analysis at home has to be conducted individually.
- No collaboration for quizzes.
- A student who was caught cheating would be given a zero for that lab/quiz (may also lead to a direct failure 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.

Lab Schedule by Week:

Group I starts in PSB 111

→ **Group II starts in PSB 112**

Week		Group 1	Group 2	Holidays
1/20	1/24	Simple Electric Circuit with a LED	Simple Electric Circuit with a LED	1/20 MLK Day
1/27	1/31	Electric Field Mapping	Measuring Electric Deflection with a Cathode-Ray Tube	
2/3	2/7	Measuring Electric Deflection with a Cathode-Ray Tube	Electric Field Mapping	
2/10	2/14	Operation of an Oscilloscope	Ohm's and Kirchhoff's Laws	
2/17	2/21	Ohm's and Kirchhoff's Laws	Operation of an Oscilloscope	2/17 Presidents' Day
2/24	2/28	Capacitor	Capacitor	
3/2	3/6	Magnetic Field Mapping	Charge-to-Mass Ratio of Electrons	
3/9	3/13	Charge-to-Mass Ratio of Electrons	Magnetic Field Mapping	
3/23	3/27	Inductor	Inductor (lab will not be made up)	3/26 Kuhio Day
3/30	4/3	Natural Oscillations with a RLC Circuit	Driven Oscillations with a RLC Circuit	
4/6	4/10	Driven Oscillations with a RLC Circuit	Natural Oscillations with a RLC Circuit	4/10 Good Friday
4/13	4/17	Snell's Law and the Lensmaker's Equation	Refraction Studies with a Prism and Spectrometer	
4/20	4/24	Refraction Studies with a Prism and Spectrometer	Snell's Law and the Lensmaker's Equation	

The University of Hawai'i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking.

If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support

and assist you. Staff can also direct you to resources that are in the community.

Here are some of your options:

Anonymous and Confidential

If you wish to remain Anonymous, speak with someone Confidentially, or would like to receive information and support in a Confidential setting, contact the confidential resources are available at www.manoa.hawaii.edu/titleix/resources/#confidential

or

If you wish to remain Anonymous, speak with someone Confidentially, or would like to receive information and support in a Confidential setting, contact:

Lesbian, Gay, Bisexual, Transgender (LGBT) Student Services

Lesbian, Gay, Bisexual, Transgender and Intersex (LGBTI) Student Services strives to maintain a safe and inclusive campus environment that is free from harassment and discrimination. The office provides direct services to students of the University of Hawai'i at Mānoa to confidentially discuss or seek advocacy and support for mistreatment due to their actual or perceived sex, gender identity, gender expression, or sexual orientation.

Cameron Miyamoto
Queen Lili'uokalani Center for Student Services, Office 211
2600 Campus Road
Honolulu, HI 96822
(808) 956-9250
email: lgbtq@hawaii.edu
web: <http://manoa.hawaii.edu/lgbt/>

Office of Gender Equity

The Office of Gender Equity offers direct services to victims and survivors of sexual harassment and sexual assaults. Brief descriptions of services offered are available here.

Jenna Friedman
Queen Lili'uokalani Center for Student Services, Office 210
2600 Campus Road
Honolulu, HI 96822
(808) 956-9499
email: geneq@hawaii.edu
web: manoa.hawaii.edu/genderequity

Prevention, Awareness, and Understanding (PAU) Violence Program

Prevention, Awareness, and Understanding (PAU) Violence Program exists to inspire, educate, and empower students and campus communities to build safe living-learning environments, end interpersonal violence, and encourage holistic well-being in ways that are supportive, collaborative, student-centered, and strengths-based. PAU Violence Program staff provides direct services to all University of Hawai'i at Mānoa students including crisis response, safety planning, academic support, and referrals to campus and community resources.

Jennifer Barnett Leslie Cabingabang
Queen Lili'uokalani Center for Student Services, Office 211
2600 Campus Road
Honolulu, HI 96822
(808) 956-8059
email: uhmpau@hawaii.edu

Student Parents At Mānoa (SPAM)

Student Parents At Mānoa (SPAM) seeks to increase the visibility of and resources for student parents at UH Mānoa as they pursue education while parenting. SPAM staff provide advocacy, support, and referrals for pregnant and parenting students to help them succeed in their educational goals.

Teresa Bill
Queen Lili'uokalani Center for Student Services, Office 211
2600 Campus Road
Honolulu, HI 96822
(808) 956-8059
email: gotkids@hawaii.edu
web: manoa.hawaii.edu/studentparents/

Counseling and Student Development Center (CSDC)

The Counseling and Student Development Center (CSDC) offers support to UHM students, staff, and faculty to assist with personal, academic, and career concerns. All services are confidential and most are free of charge for Mānoa students. They also offer free consultation to faculty and staff on personal and student-related issues as well. CSDC office hours are from 8:00 a.m. to 4:30 p.m., Monday through Friday. They also offer immediate walk in appointments for urgent or emergency/crisis services during their regular daily hours.

Queen Lili'uokalani Center for Student Services, Office 312
2600 Campus Road
Honolulu, HI 96822
(808) 956-7927
email: uhmcsdc@hawaii.edu
web: www.manoa.hawaii.edu/counseling/

University Health Services Mānoa (UHSM)

The University Health Services Mānoa (UHSM) is staffed by physicians, nurse clinicians, nurses, and other support staff, and offers a wide range of medical services and programs to UH Mānoa students, with many of the services also available to UH Mānoa faculty and staff and students from other UH campuses. Services include general medical care on a walk-in basis; women's health, sports medicine, psychiatry, and dermatology clinics by appointment; pharmacy and clinical laboratory; and student training, employment and volunteer opportunities.

1710 East West Road
Honolulu, HI 96822
(808) 956- 8965
hawaii.edu/shs/
Reporting

If you wish to Report an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact:

Dee Uwono
Director and Title IX Coordinator
Hawai'i Hall, Office 124
2500 Campus Road
Honolulu, HI 96822
(808) 956-2299
t9uhm@hawaii.edu

As a member of the University faculty, I am required to immediately report any incident of sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and I cannot guarantee confidentiality, you will still have options about how your case will be handled.

My goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

For more information regarding sex discrimination and gender-based violence, the University's Title IX resources and the University's Policy, Interim EP 1.204, go to www.manoa.hawaii.edu/titleix/