Course:	PHYS 151L, Section 009, Mechanics, Spring 2018
Lab Schedule:	R, 9:00 – 11:50 AM
TA:	Samuel Mukai
Email:	Use Laulima
Office:	WAT 421
Office Hours:	R, 8:00 – 8:50 AM
Website:	http://go.hawaii.edu/hbj
Text:	Harris, General Physics Laboratory I: Mechanics: Physics 151L and 170L, 2nd Ed. (https://he.kendallhunt.com/product/general-physics-laboratory-i-mechanics-physics-151l-and-170l-ebook)

Student learning outcomes:

- To 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.
- Report your result in a scientific fashion.

Preparation for the lab:

- Use two notebooks. Only black marbled composition notebooks.
- 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 for all reports 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:

- The class will start most times with a 10-15min quiz, potentially followed by a quick discussion of the answers. Quizzes will be administered on Laulima during class It will be open during the time allotted. If you are late to class, you will not receive extra time to for the quiz unless I am notified in advanced.
- 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.
- 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.

Format of 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 only using your report.

- Start with writing the experiment's title and your partners' name/s.
- Structure:
  - **Objectives:** The purpose of the lab. The objective part should not be very long. Include concepts or theory that are covered, formulas or equations that will be tested, and what measurements will be made, supposedly indicated by the formula. Comment on the assumptions that were made if that testing the assumptions was one of the objectives.
  - **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:** 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.). I will provide you through out the semester the layout of the data.
  - **Calculations:** Transform your data into results through formulas explained in the the objectives. **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 for your lab report.
  - **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. Write **units** for all physical quantities. Not using units results in a deduction of points for your lab report.
  - **Discussion of errors:** Discuss the systematic and statistical errors involved in your experiment. Support your discussion with quantitative results from you calculations.
  - **Conclusion:** Write a conclusion in your own words. Explain whether the experiment fulfilled its objectives. Include what you learned and how you would improve the experiment.
  - **Questions:** Answer the questions assigned at the beginning of every class.

Grades:

See Below

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.
- 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 report 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 day – 15% off
  - 2 days – 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 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 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 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 that 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. 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 (Group I):

Mechanics	**Date:**	**Room #:**
● Intro and discussion	1/18	108
● Vectors	1/25	108
● Errors	2/1	108
● Darts	2/8	108
● Pendulum	2/15	108
● Air Track	2/22	110
● Energy Transfer in Collisions	3/1	110
● Kinetic and Potential Energy	3/8	108
● Rotational Motion	3/15	110
● Natural Oscillations	3/22	108
Spring Recess	3/26 – 3/30	
● Driven Oscillations	4/5	108
● Liquid Drag	4/12	110
● Spring of Air	4/19	108