PHYS170L: General Physics I Lab
Spring 2015: January 12–May 15
W 12:00 PM–2:30 PM, Room: STB 209

Version 2: February 1, 2015 (subject to change)

Instructor: Kathy Cooksey, Ph.D.; STB 219; kcooksey@hawaii.edu; 808-932-7195
Office Hours: MT 1–2 PM, W 9–10 AM, and by appointment

Course Description: A laboratory supplement for PHYS106 and PHYS170; covers basic principles of experimentation and physical measurement. Presents illustrative experiments in mechanics, heat and waves.

Pre-requisites: PHYS106 or PHYS170 which can be taken concurrently.

Class Rules:

1. Students are required to read the lab manuals and view videos before the lab period and bring any pre-lab assignments to class (usually a table for data or a pre-formatted spreadsheet).
2. Students more than 15 minutes late to class will not be permitted to participate in that day's lab. Students with understandable issues with this (e.g., another class very far away, mobility problems, etc.) must discuss the situation with the instructor.
3. It is required for the students to conduct the lab experiment to submit a lab report. The lab reports are due in a week, whether there is a lab or not.
4. Students should be respectful and supportive of their peers' learning, which means helping each other with difficult concepts but not just giving the answer.

Email, Textbook, and Websites:

- UHH considers the `hawaii.edu` email and Laulima an official form of communication; students are responsible for receiving and returning information in a timely manner.
- There is no required textbook for the lab, but there are manuals and videos on the course Laulima site. At a minimum, there are two videos and one manual per lab; there are supplemental videos that show how various equipment are used, to be watched as needed.
- The Laulima course website is listed under PHYS-170L-005 (HIL.12985.SP14). This site will be the hub for all course information.

Lab Schedule (subject to change): * Indicate labs where the air track supplemental video should be viewed.

Week	Dates	Lab
1	12–16 Jan	Introduction
2	19–23 Jan	1. Random Errors
	19 Jan	*MLK Day (no class)*
3	26–30 Jan	2. Force Table
4	2–6 Feb	3. Gravity on Earth*
5	9–13 Feb	4. Newton's 2nd Law
6	16–20 Feb	(Make-up)
	16 Feb	*President's Day (no class)*
7	23–27 Feb	5. Simple Pendulum
8	2–6 Mar	6. Rotational Dynamics
9	9–13 Mar	7. Inelastic Collisions*
10	16–20 Mar	8. Elastic Collisions*
	23–27 Mar	*Spring recess (no class)*
11	30 Mar–1 Apr	9. Archimedes' Principle
	3 Apr	*Good Friday (no class)*
12	6–10 Apr	(Make-up)
13	13–17 Apr	(No lab)
14	20–24 Apr	10. Heat Engine
15	27 Apr–1 May	11. Speed of Sound
16	4–6 May	(No lab)
17	11–14 May	*Finals Week*

PHYS170L-005: Lab #*X* – *Required Lab Report Format*

Student's Name
Lab Partner #1 Name
...

1. Abstract

An abstract is a short summary of the entire lab: what is the point, what was done, what are the results and conclusions. This and the whole report should be in past tense.

2. Introduction

This section contains a brief overview of the objective of the lab that shows the student understands the physics background and motivation. Important equations and derivations should be here. It is not be a word-for-word replication of the lab manual introduction.

3. Procedure

The procedure section is a brief re-stating—in the student's own words—of the steps and techniques required to complete the lab. It is important to also explain when and why the procedure deviated from the manual. It is written in first person (e.g., "we did") or passive voice (e.g., "it was done").

4. Raw Data

This section contains any data recorded during the course of the lab, which is usually presented in a table with informative headers, appropriate units, and uncertainties, if applicable. Partners' raw data must agree exactly.

The Raw Data table may include Derived Data columns, to be described in the next section.

5. Derived Data, Calculations, and Error Analysis

Here is where all calculations and any error analysis required by the lab manual go. If a calculation is repeated on many measurements, a complete example calculation is sufficient; rules for number of significant figures should be followed. If software was used for calculations, a description of how it was used should be given (e.g., what Excel function was used, how the Numbers columns were set up, etc). The lab manual specifies how the final results should be presented (e.g., tables, charts, plots). Labels, units, and error bars should be included as appropriate.

When there are multiple measurements of the same quantity, it is appropriate to compute the mean (μ) and standard deviation (σ). "Accurate" is typically defined as $N_\sigma = \left|\frac{theor-\mu}{\sigma}\right| \leq 3$. "Precise" generally means $\frac{\sigma}{|\mu|}\cdot 100\% \lesssim 10\%$. If there is no standard deviation, the results are assessed to be accurate if the percent error is $\left|\frac{theor-exp}{theor}\right|\cdot 100\% \lesssim 10\%$.

6. Conclusion

The objective of the experiment is addressed here. This is done by analyzing the derived data, connecting it to the science objective, and justifying the significance, accuracy, and precision based on the statistical analysis or percent errors, as required by the lab manual. Whether the results support the hypothesis must be directly addressed, including a comparison of the measured value(s) to the accepted one(s), as applicable. If the results do not support the hypothesis, a reasonable explanation is necessary. Data or calculations from the previous sections should be used to help make conclusions.

7. References

If any sources besides the lab manuals, videos, or course textbook were used, hey are cited here. Citing a work does not mean it can be plagiarized.

(Your lab report may, of course, span more than one page. It must be typed.)

Grading:

- The grade depends on the average of the lab reports. Lab reports will be graded on a 10-point scale. Every part of the lab report is important but the emphasis is on the following:
  - logical conclusions and thoughtful discussions,
  - correct calculations and error analysis, and
  - clear tables and figures.
- One extra-credit point is possible, for example, for insightful knowledge of the lab topic or a particularly elegant and thoughtful way of presenting the data or figures.
- There are a limited number of opportunities to make up labs. Students may only make up labs for which they were excused.
  - If a student needs to miss a lab for a valid reason, s/he needs to contact the instructor before the start of class time; this includes official, University-related activities.
  - If a student were unable to email in advance due to extreme circumstances, s/he should contact the instructor as soon as possible.
- Late lab reports are accepted within 24 hours of the deadline for a maximum of 75% credit.
- The lowest grade of the completed lab reports will be dropped.
- As per the UHH Student Code of Conduct, cheating is not tolerated. Instances of cheating will be thoroughly investigated.
- The letter grade will be given based on the chart below:

Grade	% Required
A	≥ 93
A−	$[90, 93)$
B+	$[87, 90)$
B	$[83, 87)$
B−	$[80, 83)$
C+	$[77, 80)$
C	$[73, 77)$
C−	$[70, 73)$
D	$[60, 70)$
F	< 60

where e.g., $[90, 93)$ means $\geq 90\%$ and $< 93\%$.

Disability Support: Any student with a documented disability who would like to request accommodation should contact the University Disability Services Office at 932-7623 (V) or 932-7002 (TTY), as early in the semester as possible.

Advising: Advising is a very important resource designed to help students complete the requirements of the University and their individual majors. Students should consult with their advisor at least once a semester to decide on courses, check progress towards graduation, and discuss career options and other educational opportunities provided by UH Hilo. Advising is a shared responsibility, but students have final responsibility for meeting degree requirements.

Kilohana Academic Success Center: The KASC provides academic support opportunities for all UH Hilo students that foster their development into independent, self-motivated learners. Students who visit Kilohana have access to subject-specific and academic skills tutoring from UHH students selected for their academic achievement and dedication to helping others succeed. Kilohana is located on the lower level of the Mookini Library and on the web at `http://hilo.hawaii.edu/kilohana/`.

Human Rights: The University of Hawai'i at Hilo prohibits discrimination in its education programs based on race, national origin, color, creed, religion, sex, age, disability, veteran status, sexual orientation, gender identity or associational preference. If at any time during class you feel uncomfortable about what is being talked about, or feel that your human rights have been violated, please feel free to leave the room. However, the instructor asks that you confer with her as soon as possible about what happened so that appropriate action can be taken if necessary to avoid future problems. If you are uncomfortable speaking with the instructor about your concern, please contact Kalei Rapoza (`kaleihii@hawaii.edu`), Interim EEO/AA Director, at 932-7641.

UH Hilo Sexual Assault Policy: UH Hilo provides confidential assistance for victims of sexual assault. Counseling Services on-campus and the YWCA Sexual Support Services off-campus offer guidance regarding medical assistance and emotional help and can discuss options for reporting sexual assaults to law enforcement. All conversations are private and confidential. The UH Hilo Sexual Assault Policy can be found at: `http://hilo.hawaii.edu/uhh/vcsa/documents/UHHSexualAssaultPolicy.pdf` For assistance during the day, contact UH Hilo Counseling Services at (808) 932-7465; or, after hours and on weekends, contact the YWCA Sexual Assault Support Services at (808) 935-0677.

Student Conduct: Students are expected to follow the University of Hawai'i at Hilo Student Code of Conduct available at the following URL: `http://www.uhh.hawaii.edu/catalog/student-conduct-code.html`.