

## Syllabus

**Website:** <https://go.hawaii.edu/9kb>

**Text:** The lab manual can be downloaded from the website listed above.

### Mode of Instruction:

- The course is conducted in in-person format

### 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.
- Reporting results in a scientific fashion.

### Prerequisites and withdrawal rules:

- As a strict prerequisite, the corresponding lecture has to be taken concurrently or before. It is not possible to take the mechanics and E&M labs concurrently (even if you have taken both lectures before). No exceptions will be made.
- As a consequence, if you decide to withdraw from the corresponding lecture you also have to withdraw from the corresponding laboratory course.

### What to expect:

- Attendance is mandatory. If a student does not attend the lab and conduct the experiment themselves, they will receive a zero score for this experiment.
- Teaching assistants will hold 30-45min lectures about the experiment, including theory, setup, and data analysis. It is expected that the students interact a lot and ask questions.
- For the remaining ~2h, the students will conduct the experiments and start the data analysis. Every student will work on their own experimental setup. 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, start working on the assignment.
- Nobody should leave without the TA signed data tables.
- The weekly assignment covers a few theoretical questions and focuses on data analysis and data interpretation.
  
- Each student has to submit their own solutions to the worksheets for all experiments. Please see rules on academic dishonesty below.
- Please also see the rules for late submissions below.

### Worksheet:

Each worksheet will have questions on the following:

- Objective of the experiment
- Theory behind the experiment
- Experimental procedure
- Data analysis
- Discussion and conclusion

Solutions are due one week after the scheduled in-person time. The solution should be prepared as a **typed out** document and submitted on laulima as a pdf:

- Start with writing the experiment's title.
- List the date you are writing the solution.
- Use the titles and subtitles from the worksheet to structure the solution.
- Data analysis:
  - Conduct the data analysis in SciDAVis:
    - Make sure all axes have labels.
    - Make sure all axes have units.
    - Make sure graphs have titles.
    - Make sure graphs have error bars.
  - Calculations
    - Show all non-trivial calculations.
    - Show all error propagation calculations.
    - Make sure all calculations have units.
    - **It is okay to handwrite the calculations. However, these handwritten calculations have to be included in your typed report in a reasonable way:**
      - Scan or take a high-resolution, well-lit photo of the handwritten calculation.
      - Crop the photo and insert into the solution document.
      - Ensure that the inserted image has a high enough resolution and is not blurry.
      - Ensure that the font size of the insert handwritten solution is roughly the same as the rest of the document.
      - Illegible handwritten parts will be marked as zero.
- Worksheets have to be submitted on Laulima as a single **pdf** file. Typical text processing software should be used (word, libreoffice, google doc). The pdf file needs to be submitted before the deadline date.
- Penalties for late worksheets:
  - 1 week late – 15% off
  - more than 1 week late → **The solution will not be accepted and will count as 0%.**

### Grading:

Because teaching assistants have slightly different grading styles, the average scores for the various teaching assistants will be normalized to each other. The normalized values from all sections will be used to define the grade cutoff values for a grade distribution over all sections with about 25% of the grades in the A- to A+ range, 40% in the B- to B+ range, 27% in the C to C+ range, and below. This means that students in a section with a stricter grader will be

“curved up,” and those with a less strict grader will be “curved down.” Also, every experiment carries the same weight for the grade calculation.

**Office hours:**

The office hours schedule will be posted on the course website.

**Academic dishonesty:**

- No cheating or copying is allowed. Every student has to submit their own solution. Students are explicitly not allowed to use solutions from past semesters (in whatever way obtained) and submit them as their own.
- You can exchange ideas about the assignments with classmates, but you have to work out your own solutions. It is not permitted that students share solutions among each other. For example, every student has to write their answer in their own words and have to prepare their own graphs.
- A student who was caught cheating would be given a zero for the whole assignment (may also lead to a direct failure of the course).
- Also, be warned that websites that provide solutions to the course assignments can provide instructors with the information who accessed the content and at what time. Using third-party websites that provide solutions to the course assignments is not allowed.
- Cheating incidents will be reported to the Office of Student Conduct.
- Furthermore, it is not allowed to upload the course materials that were shared with you (lab manuals, worksheets, and all other materials) to third-party websites that are potentially illegally monetizing the materials.
- In this course, students are not permitted to use generative AI applications such as ChatGPT, Gemini, or Bing, in whole or in part, to complete assignments. Grammar and spell checking tools such as those integrated into MS Word may be used. If you have any questions about whether a particular tool or specific use is permitted, check with the teaching assistant.

**Missed Worksheet Submissions:**

- A missing worksheet submission corresponds to 0% for this experiment.
- To receive credit for a late submission, a student must inform (email or call) their TA before or immediately after missing a submission deadline and produce a doctor's note or any other evidence. If this is not the case the student receives 0% for the late submission.
- **Only one worksheet submission can be missed.** A second missing worksheet will result in failing the course.

**Schedule:**

<b>Date</b>	<b>Group 1</b>	<b>Group 2</b>
1/20	1 General Course Information/2 Dimensional Analysis and Linearization	1 General Course Information/2 Dimensional Analysis and Linearization
1/27	3 Introduction to Error Analysis/4 The Mathematics of Error Analysis	3 Introduction to Error Analysis/4 The Mathematics of Error Analysis
2/3	5 Introduction to Vectors/6 Vector Addition with a Force Table	5 Introduction to Vectors/6 Vector Addition with a Force Table
2/10	7 The Normal Distribution with Darts	7 The Normal Distribution with Darts
2/17	8 Gravitational Acceleration with a Pendulum	9 Gravitational Acceleration on an Inclined Plane
2/24	9 Gravitational Acceleration on an Inclined Plane	8 Gravitational Acceleration with a Pendulum
3/3	10 Conservation of Energy with a Pendulum	11 Conservation of Energy and Momentum in a Collision
3/10	11 Conservation of Energy and Momentum in a Collision	10 Conservation of Energy with a Pendulum
3/24	12 Natural Oscillations with a Spring	13 Moment of Inertia of a Wheel
3/31	13 Moment of Inertia of a Wheel	12 Natural Oscillations with a Spring
4/7	14 Bulk Modulus of Air	15 Driven Oscillations
4/14	15 Driven Oscillations	16 Fluid Drag
4/21	16 Fluid Drag	14 Bulk Modulus of Air

**Attendance policy**

Students who are enrolled in this course, but never attend will be flagged by the course instructor for non-participation

before the last day to add/drop (for 100% tuition refund) deadline. Flagged students will be administratively dropped by the Office of the Registrar. Any changes to a student's enrollment status may affect financial aid eligibility and can result in the return of some of all of federal student financial aid.

### **Statement on Disability: KOKUA Program**

If you have a disability and related access needs, please contact the KOKUA Program (Office for Students with Disabilities) at 956-7511, [KOKUA@hawaii.edu](mailto:KOKUA@hawaii.edu), or go to Room 013 in the Queen Lili'uokalani Center for Student Services. Please know that I will work with you and KOKUA to meet your access needs based on disability documentation. Kokua's services are confidential and offered free of charge.

### **Academic Integrity and Ethical Behavior: Office of Student Conduct**

Cheating, plagiarism, or other forms of academic dishonesty are not permitted within this course and are prohibited within the System-wide Student Conduct Code (EP 7.208). Examples include: fabrication, facilitation, cheating, plagiarism, and use of improper materials. Any incident of suspected academic dishonesty will be reported to the Office of Student Conduct for review and possible adjudication. Additionally, the instructor may take action in regards to the grade for the deliverable or course as they see fit.

### **Title IX**

UHM 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 experiences any of these, UHM has staff and resources on campus to support and assist you. Staff also can direct you to resources in the community. Here are some:

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, contact: (\* Confidential Resource)

- Counseling & Student Development Center\* (808) 956-7927  
[manoa.hawaii.edu/counseling/](http://manoa.hawaii.edu/counseling/)
- Office of Gender Equity\* (808) 956-9499  
[manoaadv@hawaii.edu](mailto:manoaadv@hawaii.edu)
- Lesbian, Gay, Bisexual, Transgender, Queer (LGBTQ+) Center (808) 956-9250  
[manoa.hawaii.edu/lgbt](http://manoa.hawaii.edu/lgbt)
- Respondent Support (808) 956-4392  
[PAUrs@hawaii.edu](mailto:PAUrs@hawaii.edu)
- Student Parents at Mānoa (SP@M)\* (808) 956-8059  
[manoa.hawaii.edu/studentparents/](http://manoa.hawaii.edu/studentparents/)
- UH Confidential Advocacy\*  
[advocate@hawaii.edu](mailto:advocate@hawaii.edu)
- University Health Services Mānoa\* (808) 956-8965  
[hawaii.edu/shs/](http://hawaii.edu/shs/)  
<http://www.manoa.hawaii.edu/titleix/resources.html#confidential>

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:

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

EP 1.204, go to: <http://www.manoa.hawaii.edu/titleix/>

**Department of Public Safety:**

(808)956-6911 (Emergency) / (808)956-8211 (Non-Emergency) <http://manoa.hawaii.edu/dps/>

**UH System Basic Needs**

include food and housing, childcare, mental health, financial resources and transportation, among others. Student basic needs security is critical for ensuring strong academic performance, persistence and graduation and overall student well being. If you or someone you know are experiencing basic needs insecurity, please see the following resources: <https://www.hawaii.edu/student-basic-needs/resources/manoa/>