Physics 170 – General Physics I
Physics for scientists and engineers
UH Manoa – Fall 2020

Syllabus

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Lecture: The lecture will be delivered in an asynchronous online format. The lectures will take the form of multiple videos available for students to watch. The videos will be designed to mimic the lecture load of a 3 day per week college lecture (50 minutes per lecture).

Course Description: This course is a calculus-based introduction to physics for future scientists and engineers. It covers the basics of mechanics, fluids, periodic and wave motion, and thermodynamics.

Learning outcomes: The overall learning outcome of this course is for students to understand basic principles of physics and be able to recognize and apply these principles to better understand the world around them. At the end of this course, students should be able to:

- Understand and discuss basic topics in physics
- Solve problems by making appropriate approximations, and applying appropriate physical principles and equations
- Use the understanding and ability to problem solve to recognize and understand physical processes happening in natural phenomena, in technology, and in everyday life

Required Text: University Physics – Young and Freedman, 15th Edition

Course Assignments: Course assignments will be distributed through laulima (https://laulima.hawaii.edu). Each lecture period will have 3 assigments.

1. Video assignment – A video or videos to provide the learning that would come from the lectures
2. Reading assignment – A reading assignment chosen to supplement the lectures
3. Homework problems – Homework problems designed to give students practice applying the physical principles learned, and an opportunity to assess their own understanding. Homework problems will be assigned at the same time as video and reading assignments, and I will post my solutions to the homework problems sometime in the few days following their assignment.

Grading: There will be four tests over the course of the semester, including the final. Students' final grade in the course will be a combination of their grade in the required recitation sections, and their average score on these four tests. The weighting for these two grade sources is as follows:

15% Recitation Grade
85% Average of the Four Test Grades

The following is the intended grading scale for the total grade in the class, but this may be subject to change based on the overall performance of the class.

100%> **A+** > 97%
97% > **A** > 92%
92% > **A-** > 90%
90% > **B+** > 87%
87% > **B** > 82%
82% > **B-** > 80%
80% > **C+** > 77%
77% > **C** > 72%
72% > **C-** > 70%
70% > **D+** > 67%
67% > **D** > 62%
62% > **D-** > 60%
60% > **F**

Tests: Each test will be considered comprehensive of material covered up to that point in the course, because physics tends to build on itself in such a way that the first principles learned will continue to be important for material covered later. However, the questions on each test will be heavily biased toward testing knowledge of the material covered since the prior test. Students will need to have a scientific calculator (one that is capable of calculating trigonometric functions, exponentials, powers, and roots) and should know how to use it efficiently, so that it is not a hindrance on test day.

The tests will be administered remotely. Students will sign up for a test time, and the test will be available to them online only during that test time. Students will be given one hour and ten minutes to take the test. This is intended to give you one hour to take the test, and 10 minutes to scan the test and upload the file.

Students will be required to have hand-written solutions to the test problems, and then use a phone or other device to scan the test and upload a pdf file of their solutions, **before the test time is over**. It is your responsibility to ensure that you can scan and upload your solutions in a timely manner. Any test handed in after the due time (the end of the 1 hour and ten minute test period) will not be accepted.

These are basic instructions for scanning pages and creating a pdf to upload on apple and android phones:
iphone: https://support.apple.com/en-us/HT210336
android: https://support.google.com/drive/answer/3145835?co=GENIE.Platform%3DAndroid&hl=en
However, it is your responsibility to ensure that you can create a pdf file of your test solutions. If you have problems creating a pdf file, you must solve those problems **before** the test. Whatever method you choose to use for creating a pdf of your solutions, you must be ready to reliably use it on test day.

It is strongly recommended that you practice the scanning of solutions on your homework. Late tests will not be accepted, so you must be able to scan and upload your solutions in a timely manner. In addition, it is your responsibility to ensure that your solutions can be read, followed, and understood for grading. Be sure that you write in a legible manner, and use a pen or pencil that is easily readable when your solutions are scanned. Practice on your homework, and be sure that when you create a pdf of your homework your solutions are easily understandable.

It is highly recommended that you create a note sheet of information that you expect to be useful for the test. The time constraint will mean that there is very limited time to look up information in your book. You will need to be able to solve problems in a timely manner, with the required format that is covered in the "How to Solve Problems" lecture. Your homework problems will be very similar to the test problems, so be certain that you can solve problems of this type, in the required format, quickly and neatly.

Schedule of Topics

Below is the schedule of topics covered in this course, subject to change as necessary based on circumstances that arise during the semester.

Date	Topics Covered
August 24th	Introduction, Syllabus, and all that Jazz
August 26th	What is Science? What is physics?
August 28th	Units, Measurement, Reporting Results
August 31st	Vectors, Math for introductory physics
September 2nd	Position, Displacement, Speed, and Velocity
September 4th	Position, Velocity, and Acceleration
September 7th	Labor Day – No class material
September 9th	Kinematics with constant acceleration
September 11th	Kinematics in multiple Dimensions and Projectile Motion
September 14th	Kinematics in multiple Dimensions *cont.*, Relative Velocity
September 16th	Kinematics in multiple Dimensions *cont.*
Sepember 18th	First Test – This block of time is left empty to accommodate the first test, covering material addressed before this date.
September 21st	Newton's Laws, Forces
September 23rd	Force problems, friction
September 25th	Force problems, springs, stress and strain
September 28th	Fictitious forces, fundamental forces, uniform circular motion
September 30th	Force Problems
October 2nd	Newton's Universal Law of Gravitation, Period, and frequency
October 5th	Kepler's Laws
October 7th	Second Test – This block of time is left empty to accommodate the second test, covering material addressed before this date.
October 9th	Energy
October 12th	Conservation of Energy
October 14th	Conservation of Energy problems
October 16th	Conservation of Energy problems
October 19th	Momentum
October 21st	Conservation of Momentum problems
October 23rd	Conservation of Momentum problems
October 26th	Rotational Kinematics, moment of inertia, and Torque

October 28th	Applications of Torque
October 30th	Rotational Dynamics, Conservation of Angular Momentum, Gyroscopic Effects
November 2nd	Rotational Dynamics problems
November 4th	Rotational Dynamics problems
November 6th	Third Test – This block of time is left empty to accommodate the third test, covering material addressed before this date.
November 9th	Veteran's Day – No class material
November 11th	States of Matter, Fluids
November 13th	Fluids and Pressure
November 16th	Flow of Fluids
November 18th	Simple Harmonic Motion
November 20th	Continuous Waves
November 23rd	Veteran's Day – No class material
November 25th	Non-Instructional Day – No class material
November 27th	Wave Phenomena
November 30th	Wave phenomena and music
December 2nd	Overview of class concepts – Physics of Automobiles
December 4th	Overview of class concepts – Physics and the Human Body
December 7th	Bonus Lecture – Untested material: Conceptual View of Relativity – subject to change or removal based on class requirements
December 9th	Bonus Lecture – Untested material – subject to change or removal based on class requirements
December 14th to 18th **Finals Week**	Fourth Test – This block of time is left empty to accommodate the fourth test, covering material addressed before this date.