



Physics 2A: Mechanics, Oscillations, & Waves Overview of Course

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Sept 24, 2018

Filling out the orange slip

Please take a moment to fill out your orange slip of paper.

- 1 <Your name>
- 2 <Your dream/goal for your life.>
- 3 <Do you want me to call on you at random to answer questions this term?> (Y/N)
- 4 optional: <anything you want me to know about you>

Overview of the Course

Topics

- Kinematics. Describing motion of objects without regard to forces.
- Dynamics. Finding the evolution of a system by considering the forces acting on it.
- Oscillations and Waves. Cycles of behavior in various systems.

Purpose

- Learn basic physics principles and how to apply them.
- Prepare you to use physics concepts in other subjects.
- Prepare you to take Physics 2B (or Physics 4A, if you choose to).

Overview of the Course: Textbook Topics

What we will cover

- units and measurement
- kinematic motion in 1 & 2 dimensions and vectors
- relative motion
- projectile motion, circular motion
- forces
- Newton's Laws
- energy
- linear momentum, collisions
- rotational motion
- angular momentum
- gravitation
- simple harmonic motion / oscillations
- waves and sound

Overview of the Course

Should I take this course?

You should if:

- You are curious about how nature works.
- You enjoy science, math, and problem solving.
- You are able to spend time out of class working through ideas on your own.
- You will ask questions when you don't understand something.

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You should **not** if:

- You do not have **at least 10 hours of time outside of class** a week to dedicate to this class. (5 unit class)
- You just want an easy A.
- You just want to memorize answers without understanding them.

Overview of the Course

Book

- Fundamentals of Physics Extended, 9th Edition, Halliday, Resnick, and Walker

We will cover topics from chapters 1–11, 13, and 15–17 of this textbook.

Other Books

- Physics: Principles with Applications, Giancoli (no calculus)
- Physics: A Strategic Approach, Knight (calculus with clear explanation)
- Physics for Scientists and Engineers, Serway & Jewett (the book for 4-series classes)
- Physics, 4th Edition, James S. Walker (Phys 50 book, no calculus)

Overview of the Course

Evaluation

- Two midterm tests and a final exam.
- Quizzes (and perhaps the occasional worksheet).
- Labs.

Other Assignments

- Uncollected homework problems from the textbook. (You still need to do them.)
- Read the textbook.

Overview of the Course

Evaluation

| | |
|------------------------------------|----------------|
| quizzes (& occasional worksheets?) | 20% |
| midterms | 30% (15% each) |
| final | 30% |
| labs | 20% |

Projected Grading Scheme:

| | |
|------------|------|
| 96% → 100% | = A+ |
| 90% → 95% | = A |
| 88% → 89% | = A- |
| 86% → 87% | = B+ |
| 78% → 85% | = B |
| 76% → 77% | = B- |
| 74% → 75% | = C+ |
| 65% → 73% | = C |
| 54% → 64% | = D |
| 0% → 53% | = F |

Other Resources

Resources for when you have questions

- Me. You can email me, ask me before or after class, or come to my office hour (S13, M & Th 10:30-11:30am).
- Each other. Work together! It will improve your understanding.
- The Math & Science Tutorial Center.

Where to look for course materials

- My website on the De Anza Physics page.
<http://nebula2.deanza.edu/~lanasheridan/>
(Course Studio will be a backup solution if the server goes down.)

Overview of the Course

Note about presentation of work

- For each problem make sure your method is clear.
- If there is an equation or principle you are using, write it out at the start of your solution.
- Underline, box, highlight, or unambiguously emphasize the answer.
- If the reasoning is not clear, the answer is not correct.
- Give your answers to a reasonable number of significant figures.

Overview of the Course

Note about any collected assignments

- If you cannot come to class on a due date, email me the assignment and bring the hard copy to the next class.
- If you are ill, or will have a problem handing in an assignment on time, come talk to me **before** the due date.

Useful Survival Trick

Useful Survival Trick

The Google logo is centered on the page. It consists of the word "Google" in its signature multi-colored font: the 'G' is blue, the first 'o' is red, the second 'o' is yellow, the 'g' is green, and the 'l' and 'e' are red.A simple, empty rectangular search input field with a thin blue border, positioned centrally below the Google logo.

Google Search

I'm Feeling Lucky

When you get stuck on a problem or idea, use a search engine.

Course Tool

Mentimeter

<http://www.menti.com>

- Allows me to ask multiple choice questions or do surveys, and get real-time feedback.
- You can remain anonymous.
- You need a device connected to the internet.

Load the webpage (<http://www.menti.com>) and enter the code **84 01 48**.

Course Survey and Mentimeter Trial Run

- 1 What is your previous physics experience?
 - A This is my first physics course.
 - B High school physics course (not AP).
 - C Physics 10 or another college conceptual physics course.
 - D AP Physics, Physics 50, or another college preparatory physics course.

Course Survey and Mentimeter Trial Run

2 Have you already completed Math 1A (or another calculus course)?

A No.

B Yes.

Course Survey and Mentimeter Trial Run

3 Do you plan to take the 4-level physics courses?

A No.

B Yes.

Mechanics Course Goals

Goals:

- know how to use basic theory to solve problems
- understand principles and how they apply to technology

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- Why are door knobs always on the far side of the door from the hinges?

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- Why can you hear someone's voice when they are still around a corner from you, but you can't see them?

Science

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A *scientific fact* or *scientific statement* must be

- quantitative and
- falsifiable.

quantitative

able to be measured, precise

falsifiable

able to be proven wrong

The Scientific Method

The process:

- 1 Ask a question.
- 2 Make a guess about the answer: a **hypothesis**
- 3 Make predictions based on the guess
- 4 Do experiments to confirm or disprove the guess
IF the guess is wrong: go back to step 2.
- 5 If the guess is right, formulate it into the simplest possible rule.

Hypothesis

An educated guess about a relationship between measurable quantities. It must be *falsifiable* by observations or experiments.

What is Physics?

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Physicists (and others who use physics) want to predict accurately how an object or collection of objects will behave when interacting.

Why?

- to better understand the universe
- to build new kinds of technology (engines, electronics, imaging devices, mass manufacturing, energy sources)
- to build safer and more efficient infrastructure
- to go new places and explore
- to prepare for the future

What is Physics?

How?

Amazingly, relatively simple mathematics can represent interacting physical objects.

The results of calculations give accurate predictions, provided the mathematical model is a good one.

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eg. a pool table. The system might include the balls, the sides of the table, but maybe not the whole Earth. And certainly not the Andromeda galaxy.

What is Physics?

Model

A simplified mathematical description of a system and its interactions that includes only what is necessary to make predictions.

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eg. the billiard balls are made up of atoms, but we can make very accurate predictions about their motion and collisions by just pretending they are uniform rigid spheres.

What is Physics?

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eg. $\mathbf{F} = m \mathbf{a}$

(“If I push this shopping cart twice as hard, it will accelerate twice as fast.”)

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Valid when

- $v \ll c$,
- gravitational fields are not too strong,
- distances are much bigger than ℓ_p (Planck length), etc.

Summary

- content of the course
- evaluation
- late work policy
- What is physics?

Homework

- Get the textbook: Fundamentals of Physics Extended, Halliday, Resnick, and Walker (9th Edition).
- Read the Lab instructions for tomorrow (if you are in my lab).
- Read **Ch 1** and start reading **Ch 2**.