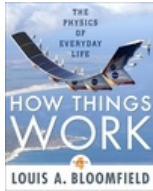


Using Physics to Understand the World: The Physics of Everyday Life

Physics 1010: Professor Noah Finkelstein



Day 1:
Introductions / Welcome
Start on motion

Reminders:
Review Website, syllabus
Reading for Thurs: Sec 1.1 Bloomfield
HW next week!

Using Physics to Understand the World: The Physics of Everyday Life

Assuming we know what
Everyday Life means,
What is
Physics
??

Physics is EVERYWHERE in everyday life

- We live in an increasingly technological society
- Example: Sending a message over the last century



- Today, EVERYONE needs a basic grasp of science for a successful society

Course Goals

1. To have an interesting class that covers physics.
2. To begin to see science in everyday life.
3. To understand that the universe is predictable rather than incomprehensible.
4. To see that science (particularly physics) is based on quantitative experiments.
5. To practice using logic, data, and analysis in order to solve problems.

Note: this is not an exercise in mathematics...

We will use math, but only as a tool for understanding ideas / the world --- basic mathematics...

Learning physics –Essential resources

1010 Team:

Instructor: Noah Finkelstein
TA: Paige Warmker
LAs: Benjamin, Anna

Textbook: Bloomfield, 'How things work'
4th Ed. Rec.; Any edition fine (you keep up).

Website: <http://www.colorado.edu/physics/phys1010/>

- Contains everything you need to know about the course (Syllabus, contact info, deadlines, dates, ...).
- Check website regularly

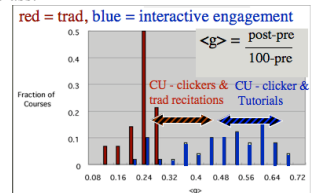


Guiding principles of course design:

1. Understand concepts through *action, thinking about them, and discussing* them with peers, *not by passively hearing* them explained. Goes doubly for solving problems.
2. *Understanding physics* (and solving problems that test that understanding) *is a learned & practiced skill*, like playing basketball, golf, or the violin. It takes time and effort

Everyone can do well if, and only if, they put in the effort. **4-6 hours per week** outside of class.

Our studies
show this:



Features of Physics 1010

1. Lectures
2. Clicker questions
3. Weekly reading quiz
4. Weekly homework assignments
5. Weekly feedback (optional)
6. 3 **in class** exams plus final
(no mid-term evening exams)

1. Lectures

- Lectures will be interactive and hopefully fun.
 - Lots of great demos
 - Sit near the front for best view – NO BALCONY SEATING
- Preclass notes will be posted on course website the day prior. (Suggest you bring these skeleton notes to take notes on)
- **Bring pre-class notes, calculator and clicker to every lecture**
- Questions and discussion (with me!) during class is encouraged
 - At least half the class will be wondering the same thing.
 - Please get my or LA's attention if I don't see your hand up.

2. Clickers



- You will use YOUR clicker in EVERY class
- Enables you to answer MC questions throughout lecture
- Engages you-- process/understand information as we go along
- Helps to keep you attentive
- Gives me instant feedback about what you do/don't understand

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Clicker warnings

- YOU are responsible for bringing your own, working and registered clicker to class
- Use only YOUR clicker. Responding with another student's clicker is a violation of the honor code and WILL be reported
- Put your contact info on your clicker incase you lose it.

Student interest survey-- Why are you in this class?

- a) Just liked physics.
- b) Satisfies science requirement and physics not as bad as other choices.
- c) Hate physics, but only class I could find / enroll in
- d) Heard Finkelstein was awesome.
- e) Other?

To learn physics and do well in this class, I expect to spend ?..... working on physics outside of class.

- a. Less than 2 hours per week
- b. 2-4 hours per week
- c. 4-6 hours per week
- d. 6-8 hours per week
- e. 8+ hours per week

3. Reading Quiz

- Reading assignments for following week advertised on website and in lecture
- 3 clicker questions at start of Tuesday lecture
- 1pt per correct answer
- Very easy if you have done the reading
- First quiz next Tuesday
- This week's reading
 - Section 1.1 (Skating) by Thursday
 - Section 1.2 (Falling Balls) by Tuesday

4. Homework Assignments

- Homework assignments will be posted and submitted electronically on D2L
- Available by Wed morning – read through before lectures
- Close the following Monday at
 - a) 7pm
 - b) midnight.
- Answers and grades will be posted on D2L after grading is complete
- Each Homework will be worth ~15-20 pts.
- Target time investment is 4+ hours per week
- NO late homeworks can be accepted.
- **Lowest HW scores dropped. No other adjustments. Do not waste - you will need this drop if you are ill later in the semester**

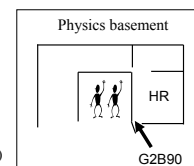
Homework 1 due Tues 9/4!

Homework on D2L

- Log into your D2L account
 - Note: this appears as a quiz... It is NOT a quiz... you will do fine
 - It is not timed.
 - Click on Homework folder and then relevant homework
 - After answering each question click 'Save Answer'
 - You can close the browser and return to carry on at any point.
 - When you are **COMPLETELY FINISHED**, then press **FINISH**.
 - You can only press FINISH and submit the assignment **ONCE**.
 - Do NOT leave it to the last second to submit your homework
- Answers and grades will be available once grading has been done.

Homework help!

- Problem solving sessions
 - Location: Back of Physics Helproom (G2B90)
 - Thursdays 2-5pm
 - Mondays 3-5 pm
 - Do these times work?
 - Come and work on homework with your classmates!
- Office/helproom hours
 - See website / syllabus.
- Physics Helproom
 - Staffed 9-5 by grad students and faculty
 - Write name on board under 'other' . Put (1010) next to it
 - Best to go at quiet times or when 1010 STAFF are there.
 - Everyone belongs there, not just physics majors – its free tutoring!



Important note

- Please take note of all the free individual help available with this class
- Variations in background and ease of understanding **guarantee** that material is not at the perfect level for everyone
- Easily fixed by coming to office hours /help sessions and discussing.
- **Easily turned into constant confusion and frustration by not keeping up!**
- **Be honest about what you do/don't understand. Seeking help will NEVER negatively affect your grade**

Collaboration vs. Plagiarism

- Collaboration encouraged
- Representing ANYONE else's work as your own is cheating.
- Once you understand an idea write it down in your own words.
- If two answers are identical, both will get zero
- **Cheating will lead to failing the class.**

Code of Hammurabi



CU Honor Code

"On my honor as a University of Colorado at Boulder student I have neither given nor received unauthorized assistance on this work."

Example of HW answer

- Q: I drop a egg A from a height of 1 m and egg B from a height of 2m. Which is travelling faster when it reaches the floor?
- **Physical principle:** Conservation of energy
- **How applies:** Initial gravitational potential energy (related to height of egg) = final kinetic energy (related to speed of egg)
- **How reach answer:** initial PE = mgh

$$\text{Final KE} = 0.5 mv^2$$

$$\Rightarrow mgh = 0.5mv^2$$

m and g the same for each egg. If PE = KE, then bigger h means bigger v.
 Egg B dropped from 2m will be travelling faster.
- **Clarity:**
 - Include every step of your argument or calculations
 - BUT keep it succinct – **don't hedge...**

Useful handout on 'a logical approach to problem solving' available on course homepage

5. Exams

- 3 Midterm exams in class
 - Thursdays: Sept 20, Oct 18, and Nov 15
 - Lowest score dropped
 - Not possible to miss more than one midterm
- Final
 - Tues, Dec 18, 1:30-4p
 - Mandatory
 - Cumulative
 - Format to be decided

Final grades

Final grades are based on the total number of points earned throughout the semester

	Approx. Points per Assignment	Number of Assignments (approx)
Inclass participation (clickers)	2-4 pts / class	~25 (2 dropped)
Inclass reading quiz	2 pts	~10 (1 dropped)
Homework	~20	12 (lowest dropped)
Midterm	40	3 (lowest dropped)
Final	80	1

Total Possible Point (Roughly!): 450

Final grades 2

- **Most important for good grade is do all the assignments!**
 - Missing class and homework put you in danger of failing, no matter how well you do on the exams!
 - Do all assignments well, potentially get B even if lousy on exams.
- **Lowest hour exam, lowest weekly homework score and 3 lowest in-class scores (reading / clickers) will be thrown out.**
 - Covers illness, car wrecks, computer crash, forgetting etc.,
 - You can miss two week's homework, one week of class, and one exam without penalty.
 - No other exemptions/allowances
 - **Don't waste early in course, you will probably need later!**

Tentative 1010 topics

(See course calendar on website)

- Section 1:
 - Motion (x, v, a, t) and how to describe it
 - Forces (friction)
- Section 2:
 - Energy and work (water distribution systems)
 - Sound (violins)
- Section 3:
 - Light or electromagnetic radiation (Lightbulbs, sun, greenhouse effect)
 - Static electricity (Lightening)
 - Electrical circuits (Flashlights, house wiring)
- Section 4:
 - Electromagnetic waves (radio, microwave ovens)

Every student to learn everything
 If its not important we took it out!

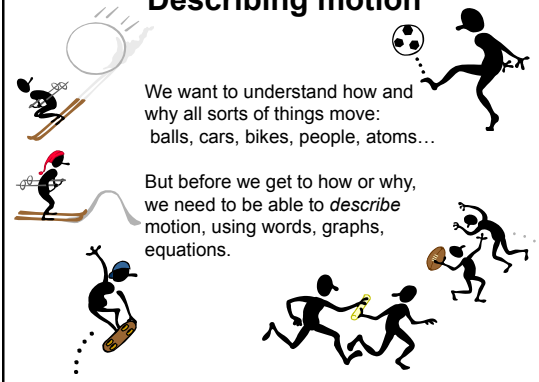
High Standards, High Achievement

- High expectations
- Expect achievement from everyone
- I will:
 - Provide lots of feedback (critical, constructive)
 - Expect feedback from you (you shape this course and your learning)
 - Use research based materials, known to improve the learning / understanding of all

How did you get to class today?

- a) Walked
- b) Rode a bike
- c) Took the bus
- d) Drove
- e) Zip line

Describing motion



We want to understand how and why all sorts of things move: balls, cars, bikes, people, atoms...

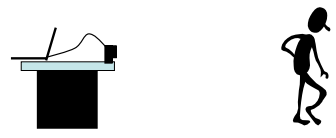
But before we get to how or why, we need to be able to *describe* motion, using words, graphs, equations.

What do you need to know to describe the motion of an object?

- A) where it is
- B) where it's going
- C) both where it is and where it's going.
- D) where its been

Position

Unit: meters (abbreviation m)
 Meter sticks; sonar
 Symbol: Often represented by 'x'



Position versus time graphs

Sketch position versus time graphs for:

1. Person moving away from origin, in straight line at steady speed

2. Person moving towards origin, in straight line at steady speed

Position versus time graphs

Sketch position versus time graphs for person moving in straight line at steady speed:

1. Away from origin
2. Towards origin

