

Handouts - syllabus

- intro survey - return by Friday

- roster

- web

Physics question

- How does your cell phone communicate? When you touch the screen, information from elsewhere can arrive at your phone. What is it about touching the screen that does this? How does information reach your phone?

Course coverage

- 1) Electromagnetism - interactions between charged particles
 - fundamental branch of physics since most matter consists of such charged particles
 - used to describe
 - a) workings of molecules / atoms / subatomic particles
 - b) properties of solid materials (conductivity)
 - c) operation of electrical + electronic devices
 - d) operation of diagnostic instruments (mass spec, NMR, photodetectors, ...)
- 2) Optics - study of light
 - used to describe
 - a) interactions between light + matter
 - b) operation of optical instruments (lenses, eyes, microscopes...)
- 3) Quantum physics - fundamental framework for physics
 - used to describe
 - a) workings of molecules / chemistry
 - b) light / matter interactions

Example of applications

PhET Optical tweezers

- show bead - move left right
- show DNA

Course details

- 1) syllabus - my contact info
- CMU email
- 2) website - show calendar page
- 3) exams dates * conflict known now - speak to me
* absences → make up - formal documentation

This week

Weds: Warm Up exercise by 9am * 2pts out of 600

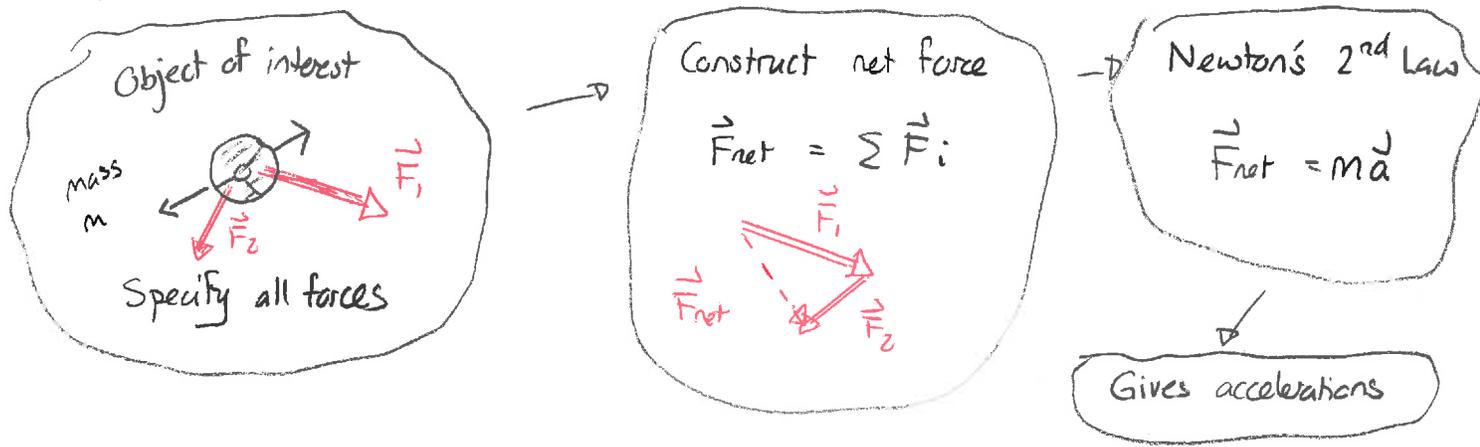
- * reading quiz
- * graded for attempt
- * show how to access D2L

Fri: HW due by 5pm * 15pts out of 600

- * Supp Ex 1, 2, 4, 5a, 5b, 6
- Ch 20 Q 6
- P 11, 49

Electrostatics

In Phys III, you would have seen a general framework for classical physics



In order for this system to work, we need laws or rules for the forces. Examples are:

- 1) gravitational forces
- 2) spring forces

There are situations where these examples cannot describe the forces.

Demo: ~~Ball + rod~~ Suspended ball + rod

- a) Neutral rod near ball. Observe?
- b) Rubbed " " " Observe?
- c) Touch rubbed rod to ball. observe?

These are clearly not spring forces. Nor can they be gravitational forces since they can be repulsive. These types of forces are called electric / electrostatic forces.

See pgs 697 - 698

Not all objects display such forces. The crucial property that an object needs to exert or feel such a force is that the object be electrically charged. Based on observations there are two types of charge:

a) positive charge



b) negative charge



These obey the following rules:

Particles with like charges repel.

Particles " opposite charges attract.