ECE 2200/10 Lecture 1 Introduction to Electrical Engineering for non-majors

A. Stolp
12/30/11
8/24/15

2200 = 1/2 semester (Mining, Mat. Sci.)

ECE 2200 Without the Physics is hard, Plan on it!

2200, Decide today when you want to take the **final**:
Final is **after** official end of class unless you ask for different accomodation today.

Make sure you are registered for the right class (2200 or 2210) and that you have the right syllabus.

2210 = Full semester (Mechanical, Chemical, etc.)

2210 Final wednesday, December 15, 8:00am

Friday labs: Will have to attend lab and watch video in same week or attend on reading day.

BOTH

Regularly check the calendar on for this class on Canvas. Watch your Canvas anouncements.
Be prepared to download and print weekly packets, which include notes and homeworks.

Homeworks are due by 11:59 pm of the due date on Canvas.
Make sure you have a way to scan your paper or do your work on a tablet so that you will can submit a .pdf file

WARNING: HWs are often due on non-class days.

Most labs start next week. Need a lab notebook and a U-card with $16 for labs.

How to survive

1. Easiest way to get through school is to actually learn and retain what you are asked to learn.
   Even if you're too busy, don't lose your good study practices.
   What you "just get by" on today will cost you later.

   Don't fall for the "I'll never need to know this" trap. Sure, much of what you learn you may not use, but you will need some of it, some day, either in the current class, future classes, or maybe sometime in your career. Don't waste time second-guessing the curriculum, It'll still be easier to just do your best to learn and retain what is covered.

2. Don't fall for the "traps".
   Homework answers, Problem session solutions, Posted solutions, Lecture notes.

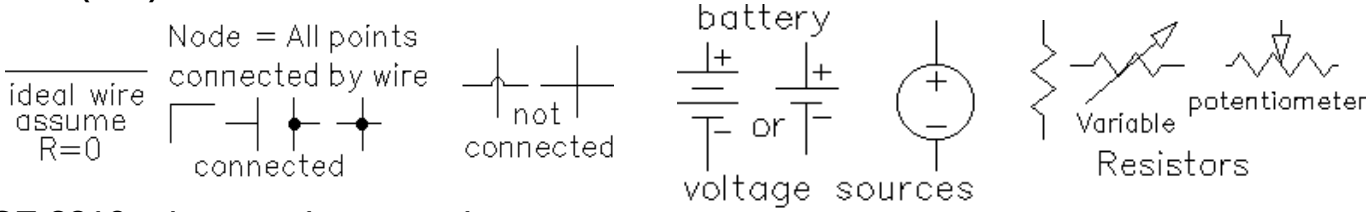
3. KEEP UP! Use calendar.

4. Make "permanent notes" after you've finished a subject or section and feel that you know it.

Lecture

Basic electrical quantities	**Letter used**	**Units**	**Fluid Analogy**
Charge, actually moves	Q	Coulomb (C)	m^3
Current, like fluid flow	$I = \frac{Q}{sec}$	Amp (A, mA, μA,...)	$\frac{m^3}{sec}$
Voltage, like pressure	V or E	volt (V, mV, kV,...)	$Pa = 1 \bullet \frac{N}{m^2}$
Resistance —∿∿—	$R = \frac{V}{I}$	Ohm (Ω, kΩ, MΩ,...)	
Conductance —∿∿—	$G = \frac{1}{R}$	Siemens (S, also mho, old unit)	
Power = energy/time	$P = V \cdot I$	Watt (W, mW, kW, MW,...)	W

Symbols (ideal)



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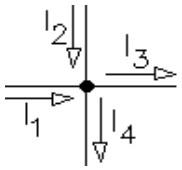
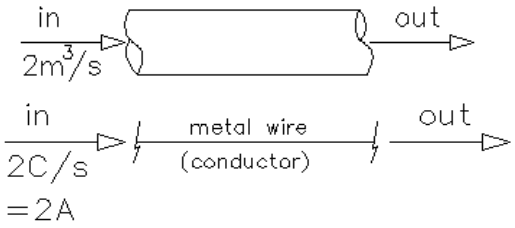
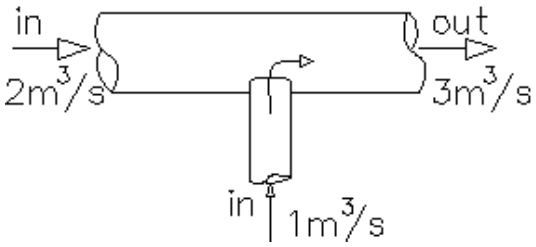
KCL, **K**irchhoff's **C**urrent **L**aw

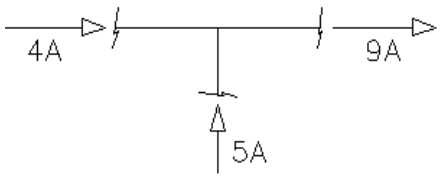
$I_{in} = I_{out}$ of any point, part, or section

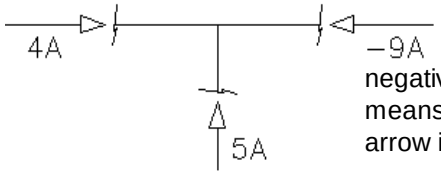


$$I_{in} = I_{out}$$
$$I_1 + I_2 = I_3 + I_4$$

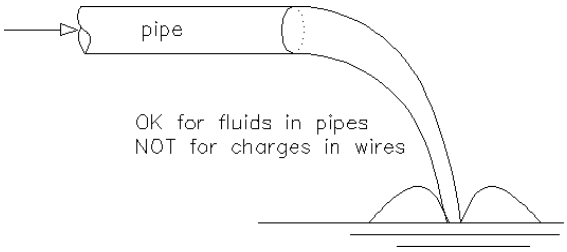








negative current means the direction arrow is wrong



Conductors Nonconductors

Massless fluid in our analogy

No gravity effects No Bernoulli effects

Reasonable because:

Electron mass is $9.11 \cdot 10^{-31} \cdot kg$

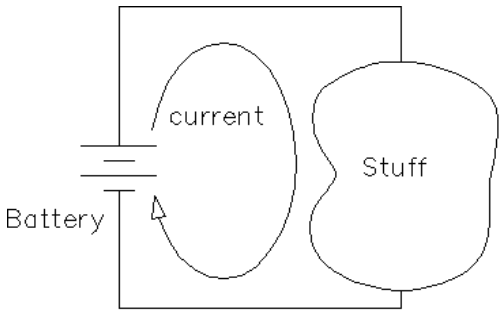
Election charge is $-1.6 \cdot 10^{-16} \cdot C$

Negative charge flows in negative direction

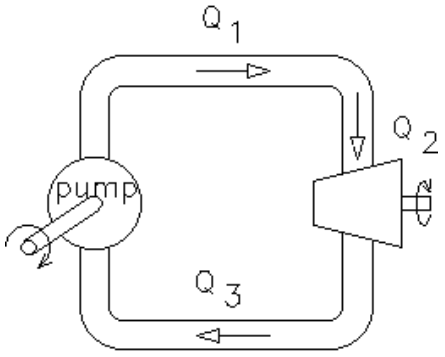
Battery also obeys KCL

No accumulation of charge anywhere, so it must circulate around.

Leads to the concept of a "Circuit"



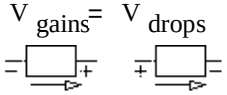
A circuit



Voltage is like pressure

KVL, **K**irchhoff's **V**oltage **L**aw

$V_{gains} = V_{drops}$



around any loop