Welcome to ENGR 40M!

Please take a seat and fill out a namecard with the name you prefer to be called by.
What is "Making"?
"Any sufficiently advanced technology is indistinguishable from magic."

Arthur Clarke, 1973
Our goal is for you to **become the magician** (and not part of the audience)

You'll have to take things apart, literally and figuratively.

This takes **patience** and **practice**

**Remember:** someone put it together, and they weren't smarter than you.
About us

Instructors

Steven Bell
Chuan-Zheng Lee

Course Assistants

Cheng Chen
Jugal Gala
Siavash Kananian
Nathan Staffa
Helen Xiong
About you: name game
Learning philosphy

- We're a community.
- Your brain is like a muscle.
- There are lots of stereotypes about who succeeds in EE - but they're false.
About the course

This is a challenging course, and we've compressed it down to 8 weeks for summer.

Expect to work 125%.

But I think it will be worth it!

And we're here to help - we've got a great student/staff ratio and we want you to succeed.
Class logistics

We have lecture MWF 1:30-2:50pm

You'll have lab once a week

Prelab will be due 24 hours before lab

3-hour lab section (times to be assigned)

Report due by lab time the following week
Homework

Homework will go out on Friday, and be due the following Friday at the beginning of class.

The homework shouldn't take more than 2-3 hours/week. If you're struggling, talk to us.
Technology
Stanford Honor Code

The Honor Code is an undertaking of the students, individually and collectively:

1) that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports, or in any other work that is to be used by the instructor as the basis of grading;

2) that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

The faculty on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as practicable, academic procedures that create temptations to violate the Honor Code.
Resources

All slides and resources will be at
engr40m.stanford.edu

Join ENGR 40M on Piazza for Q&A

Assignments submitted online via Gradescope.
Objectives
By the end of class, you should be able to:

Explain what voltage and current are, and how they are different.

Identify schematic elements and connections.

Identify congruent circuits.
Opposites attract
Electric field
What force would a positive charge feel?
Batteries and wire

A chemical reaction produces charges, until it reaches equilibrium.
Connecting the wire

Charges cancel, but the battery produces more, setting up a new equilibrium.
A field in the wire

The charge gradient produces an electric field, which pushes current down the wire!
One way to think about a circuit:
How many marbles roll through per second?
How much does a marble drop from input to output?
Current

Current is charge per second past a point

Measured in Coloumbs /second = \textbf{Amps}
We say that A has higher potential than B.

Work in an electric field
Work in a wire
Voltage is difference in electrical potential
Measured in Joules/Coulomb = Volts
Circuit schematics

A schematic is an abstraction for describing a circuit.

Some elements you should know:

- **Block element**
- **Voltage source**
- **Current source**
- **Battery**
Circuit schematics

It's important to be clear about what's connected and what is not:

A connected region is called a "node".
Draw a schematic for this circuit:

Battery

Light bulb

Switch
Congruent schematics
There are many ways to draw the same circuit. Don't be fooled just because they appear different - check what connects to what!
Which of the circuits below are congruent with the circuit above?

A

B

C

D

Go to menti.com and use code 11 69 95
What is one question you have after today's class?

Go to menti.com and use code 11 69 95