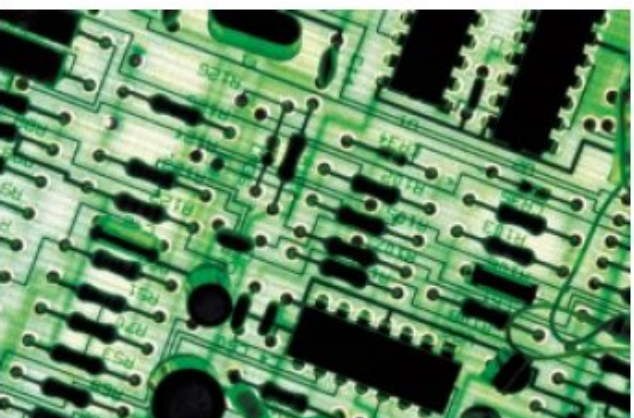


Welcome to EECS 40!

- Today:
 1. Who am I?
 2. Go over course policies and syllabus
 3. Introduction to circuits
- Figure copyright of Sheila R. Ross.



Who am I?

- Manaloor Govindarajan Balasubramanian Manikantan Bharathwaj Muthuswamy
- Aka Bharath
- 3rd semester graduate student @ Berkeley
- Concentration: Robotics
- THE way to reach me is email:
 - mbharat@cory.eecs.berkeley.edu

Course Policies

- The Course
 - Where does EECS 40 fit in?
 - Course goals
 - * Understand microelectronics
 - * Get the most out of labs
 - * Get the most out of the reader
 - Prerequisites
 - Course materials
 - * The Reader
 - * Course website: <http://inst.eecs.berkeley.edu/~ee40>
 - * Lab website: <http://inst.eecs.berkeley.edu/~ee40/Labs>

Course Policies

- The Lab
 - 140 Cory Hall
 - Must be taken concurrently
 - 2 labs/week
 - Labs done in groups
 - Individual prelab and group lab report
 - Quiz on lab material?

Course Policies

- Instructors and Office hours
 - Instructor: ME!
 - Meet your TAs and readers - Nir, Jesse, Jonathan and Amy, Kun
 - Office hours

Course Policies

- Newsgroup: `ucb.class.ee40`
- Please take a look at the course homepage on how to set it up
- Use newsgroup judiciously!

Course Policies

- The Lecture
 - In 2060 Valley Life Sciences Building
 - Lecture will start at 12:10, end at 2:00
 - 10 minute break every lecture from 1:00 - 1:10
- Lectures on “Cutting-Edge EE stuff”
- PLEASE ASK QUESTIONS!
- Need feedback: in-person, newsgroup or anonymous feedback

Course Policies

- Homeworks
 - Assigned on Wednesdays at 12PM and due promptly next Wednesday at 12:10 PM.
 - You can turn in homeworks in groups

Course Policies

- Midterms
 - Midterm 1: July 16th
 - Midterm 2: August 06th
 - Midterm location: In class, 2 hours long.
 - Review session: Yes, TBA.
 - Cheat sheet: Yes, One 8.5" x 11" sheet, front and back etc.
- Final
 - Date: August 15th
 - Final location: In class, 3 hours long.
 - Review session: Yes, TBA.
 - Cheat sheet: Yes, TWO 8.5" x 11" sheets, front and back etc.

Course Policies

- Final (contd).
 - Policy on make-up midterms and finals
 - Address special needs

Course Policies

- Grading
 - Homework: 20% Midterm I: 17.5% Midterm II: 17.5% Final: 45%
 - No curve
 - Letter grade assignment:
 - * A+: 96-100; A: 89-95; A-:83-89; B+:76-82; B:70-76; B-:66-69
 - * C+: 62-65; C: 56-61; C-:50-55; F < 50

Course Policies

- Penalty for Cheating: Severe
 - “F” in the course
 - Throw you out of the department
 - Throw you out of the University
- Questions on the Course Policies

The Syllabus

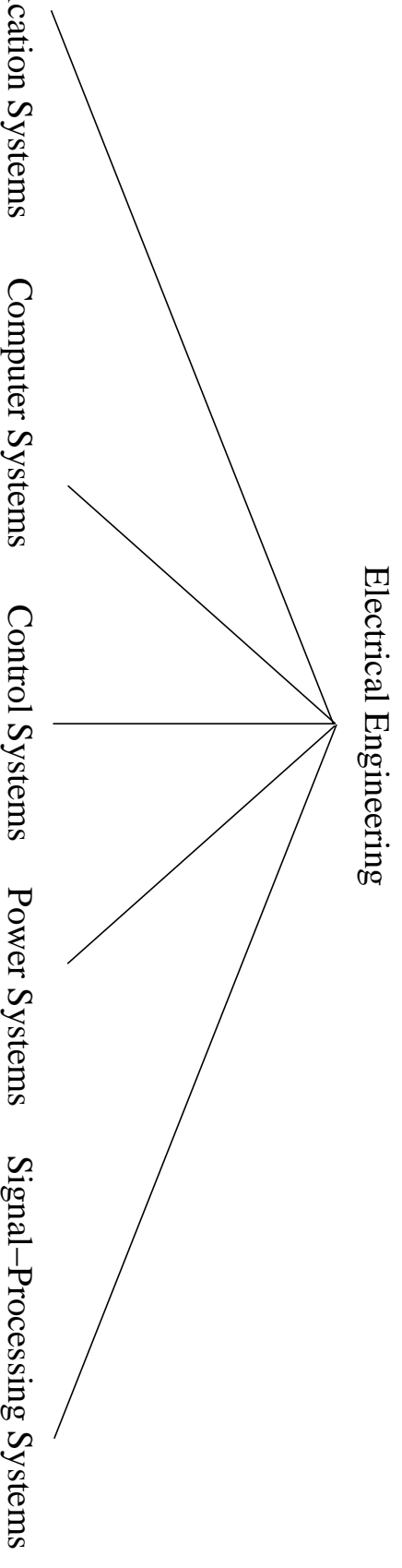
- Major topics in this course:
 - Circuit Analysis
 - Nonlinear devices: Diodes and Transistors
 - Microelectronic Circuit Applications
 - * Propagation Delay
 - * Fabrication
- TRY NOT TO FALL BEHIND IN COURSE!

Rest of the lecture...

- Intro. to Electrical Engineering
 - Overview of Electrical Engineering
 - Engineering View of Circuit Analysis
 - Review of SI Units
- Voltage and Current
- Power and Energy
- The Ideal Basic Circuit Element
- Basic Circuit Elements

Intro. to Electrical Engineering

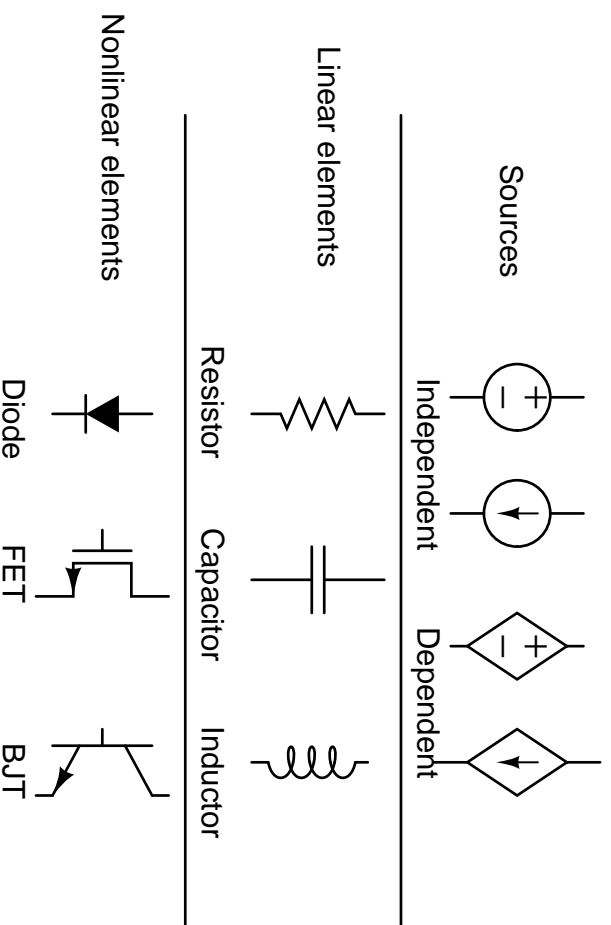
- Overview of Electrical Engineering



- EE is just applied Math!
- Involves “mathematical manipulation” of:
 - Circuits
 - Ten (!!!!!) Devices

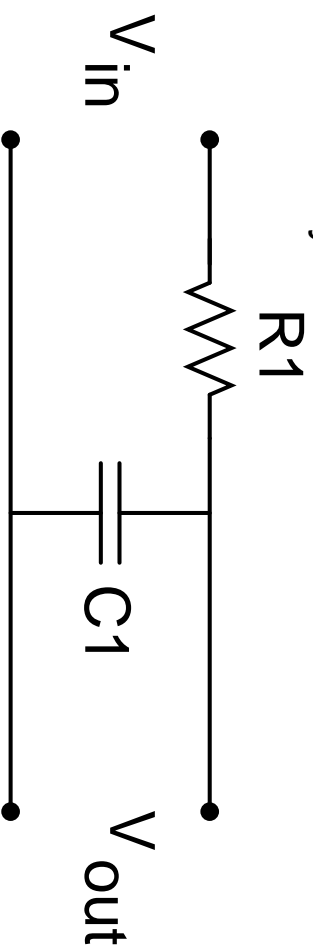
Intro. to Electrical Engineering

- These ten devices are:



Intro. to Electrical Engineering

- An Engineering View of Circuit Analysis



- Definition of an electric circuit
- What does the circuit above model? Answer: A low-pass filter
- Circuit assumptions
 - Electrical effects happen instantaneously throughout a system.
 - The net charge on every component is always zero.
 - There is no magnetic coupling between elements in a system.

Intro. to Electrical Engineering

- An Engineering View of Circuit Analysis
- Problem solving guideline:
 - What is given, what is to be found?
 - Draw a diagram
 - Think of several solutions
 - Calculate one solution
 - Be creative
 - Check your answers

Intro. to Electrical Engineering

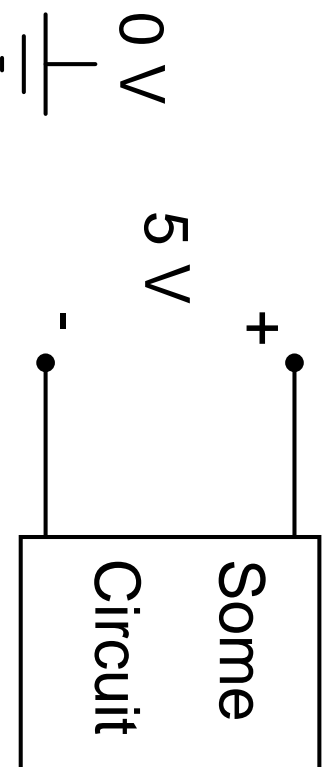
- Review of some SI Units
 - DO NOT FORGET UNITS FOR CIRCUIT VARIABLES!
 - Order of Magnitudes
 - Give the SI units for:
 - * Energy: Joule
 - * Charge: Coulomb
 - * Power: Watt
 - * Current: Ampere
 - * Voltage: Volts

Voltage and Current

- Voltage
 - Separation of charges requires energy
 - This energy is described as VOLTAGE
 - Try this analogy:
 - Voltage is to FORCE as Charge is to Inertia

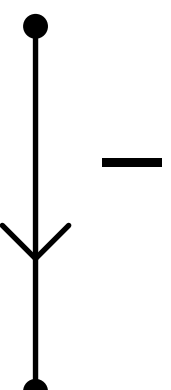
Voltage and Current

- Voltage
 - Circuit representation:



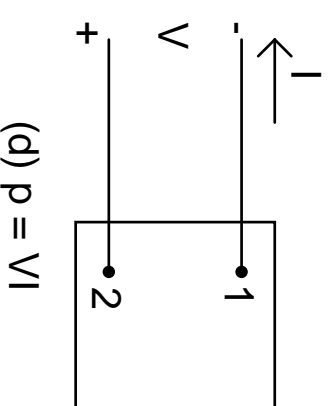
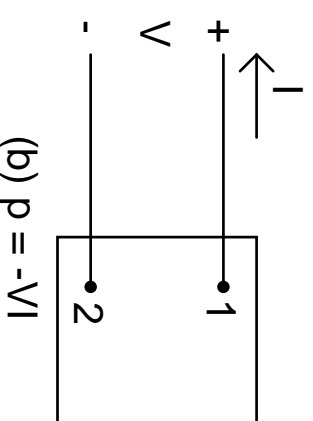
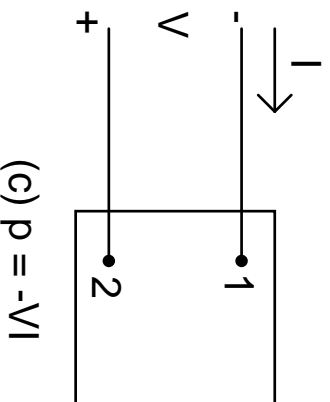
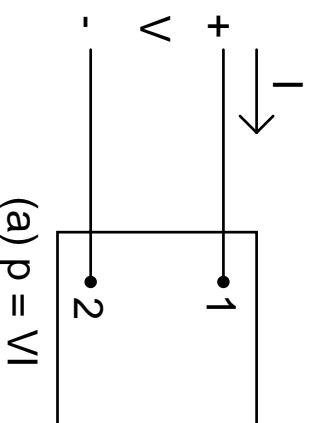
Voltage and Current

- Current
 - is defined as a flow of charge (compare with voltage)
 - The Mechanical Analogue of Current is VELOCITY
 - Circuit representation:



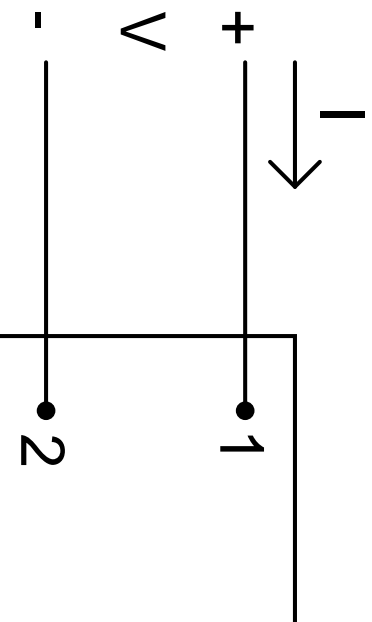
Power and Energy

- Power is the time rate of absorbing or releasing energy
- Passive sign convention:



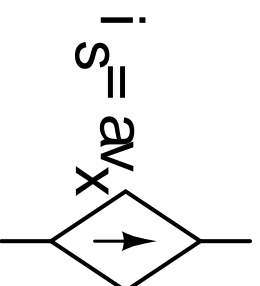
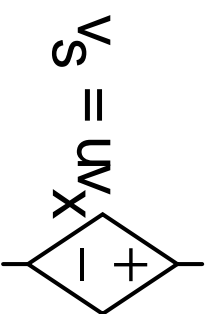
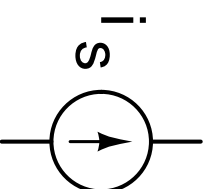
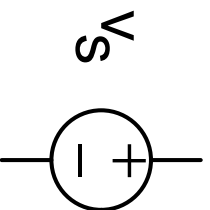
The Ideal Basic Circuit Element

- Circuit representation:
- Characteristics:
 - Has only two terminals
 - Is described mathematically in terms of current and/or voltage
 - Cannot be subdivided into other elements
- Example: Ideal voltage and current sources



Basic Circuit Elements

- Voltage and Current Sources



Tasks and Announcements

- Tasks:
 1. Get the reader!
 2. Get a named UNIX account
 3. Get a cardkey
 4. Look over the webpage and lab homepage...
 5. Reading for lecture 1: Course policies and Syllabus, Chapter 1, Section 2.1
 6. Reading for lecture 2: Chapters 2 and 3
- Announcements: I don't have office hours Tuesday morning!

In Lab This Week...

- Location: 140 Cory Hall
- This week: Intro. lab and The Oscilloscope
- Remember to get into groups!
- Remember to turn in pre-lab and lab-report

Next time...

- Series and Parallel Circuits
- Resistors
- Current and Voltage Divider
- Kirchhoff's laws