

EELE 250: Circuits, Devices, and Motors

Lecture 1

Welcome!

- Class description and syllabus
- Lecture and Lab
 - Lecture requires i-clicker
 - Lab requires a lab component kit
- Quizzes on D2L
- Exams in class

What is EE?

- First it was just electrical power,
- Then the telephone was invented,
- Then radio, which required amplifiers, which soon led to vacuum tubes, and audio engineering
- WWII: radar, and early computers
- Then came the transistor and the solid state era (analog and digital), including microprocessors
- Now lasers, optics, microfabrication, etc.

Why Study EE?

- Breadth of Knowledge—whatever you do in your career, electrical systems, electronics, and computers will be a part
- Practical Troubleshooting—understand the basics of sensors, control systems, and electrical connections

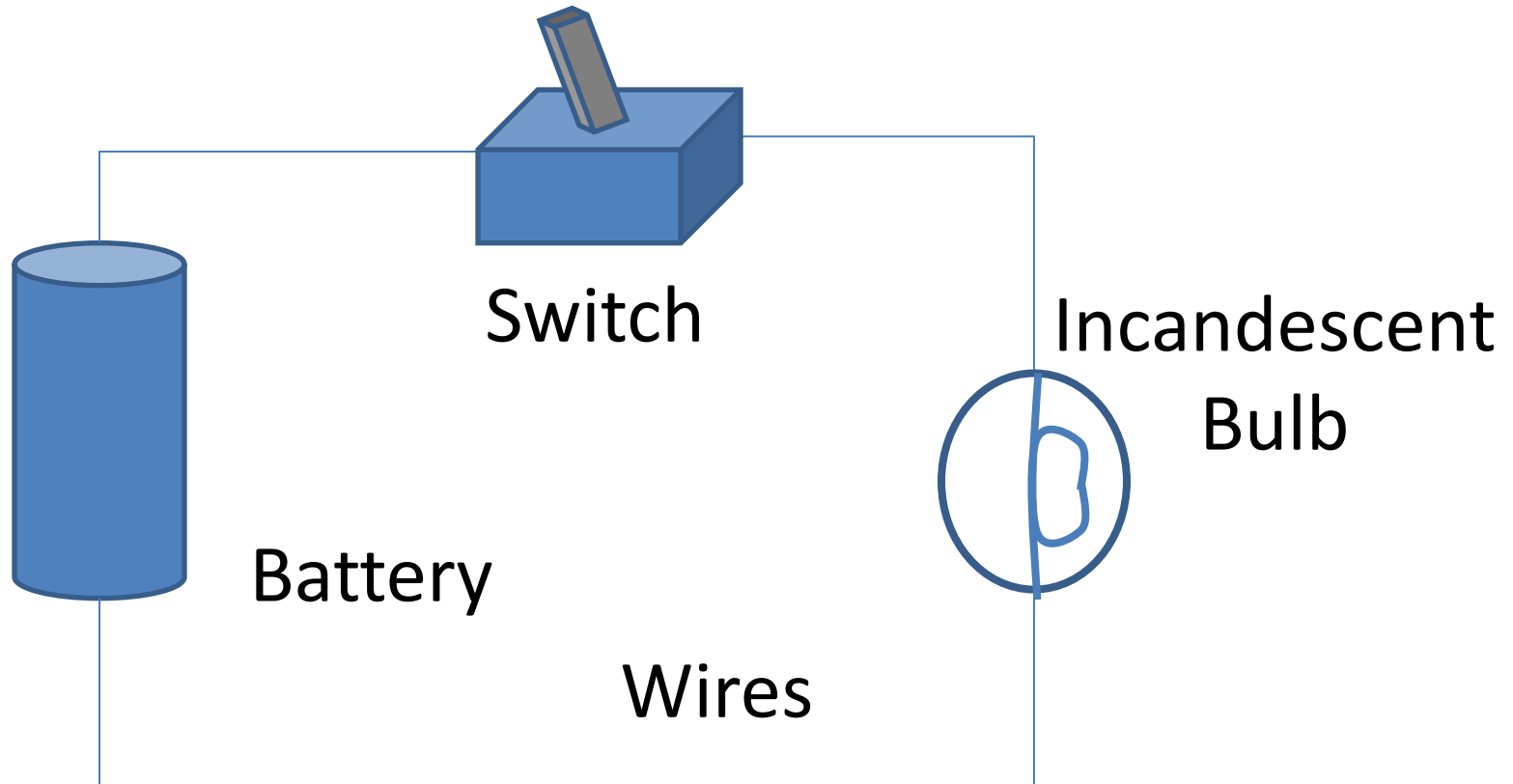
Why Study EE? (cont.)

- FE Exam Preparation—EE is 10% of the exam
- Effective Communication—engineering teams throughout your career will include electrical engineers

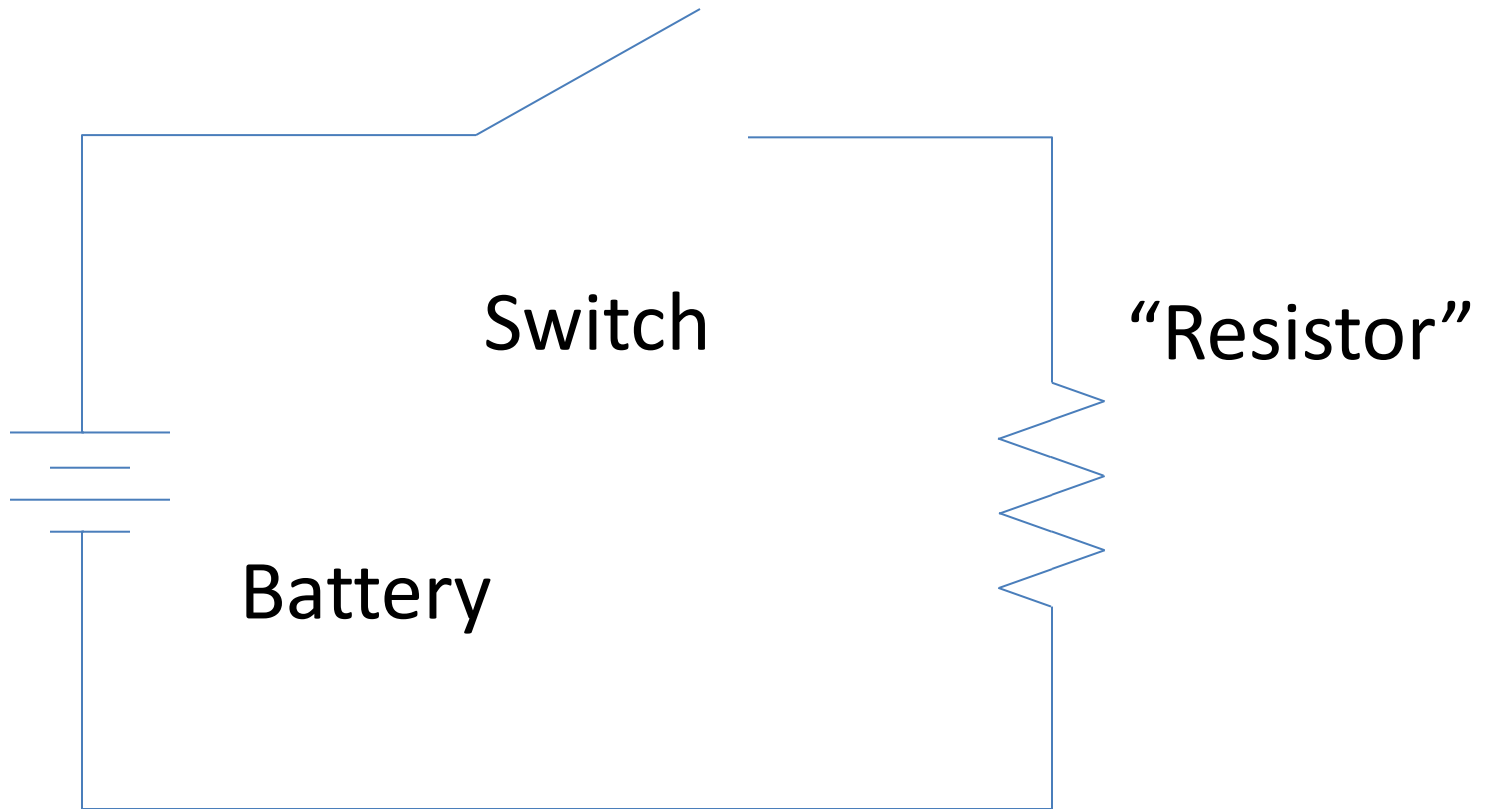
Electrical Circuits

- A set of elements connected by conducting wires
- Electrical charge moves through the circuit due to electromagnetic force
- The circuit allows electrical energy to be transferred among the circuit elements.
- A circuit must have at least one loop: a continuous path of elements and conductors

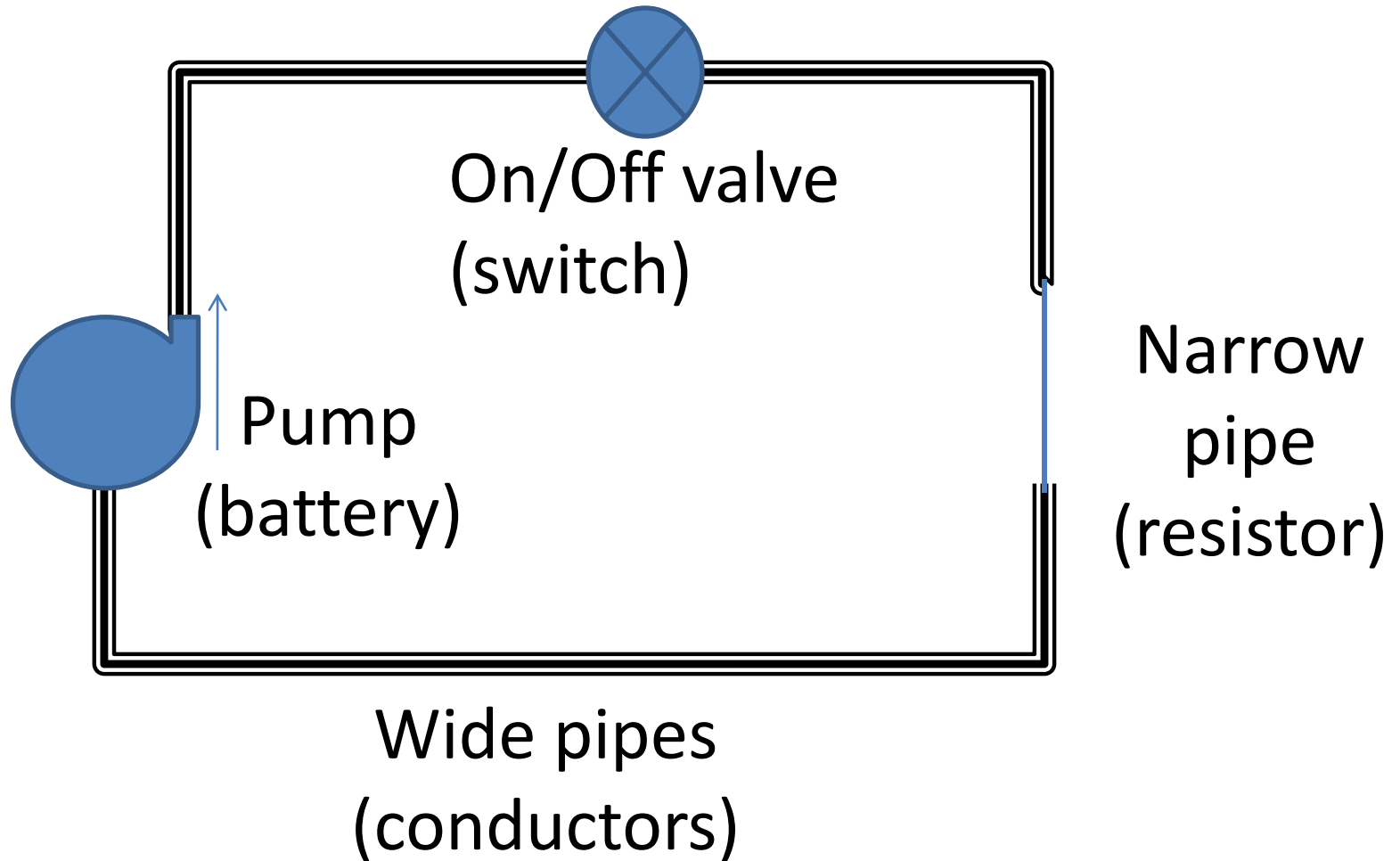
Electrical Circuits (cont.)



Electrical Circuits (cont.)



Hydraulics Analogy



Current and Voltage

- Current refers to the rate at which electrical charge moves through a wire
 - Electrical charge is measured in Coulombs. 1 C is approximately 6.241×10^{18} electrons
 - Electrical current is measured in Coulombs per second, which is designated as Amperes
- Voltage, or *electrical potential*, refers to the amount of energy associated with electrical charges
 - Energy is measured in Joules
 - Electrical potential is measured in Joules per Coulomb, which is designated as Volts

Electrical Power

- *Power* refers to the rate at which electrical energy is used.
 - Energy is measured in Joules
 - Power is measured in Joules per second, which is designated as Watts
 - The product of the current through a circuit element and the voltage across the circuit element is [Coulombs/second]x[Joules/Coulomb]
= Joules/second = Watts

Summary and Review

- Charge, Current, Voltage, Power
- Circuit Elements, Branches, Loops

Assignments:

- Get an i>clicker and register it at:
<https://www3.montana.edu/iclicker/>
- Read Chapter 1 in the textbook