

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 and notebook
- Quizzes on D2L
- Exams in class

What is EE?

- First it was just electrical power,
- Then the telegraph was invented...
- 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 in the 21st century, there is no doubt that electrical systems, electronics, and computers will be a part of it.
- Practical Troubleshooting—understand the basics of sensors, control systems, and electrical connections. This will help you do your job better and more effectively.

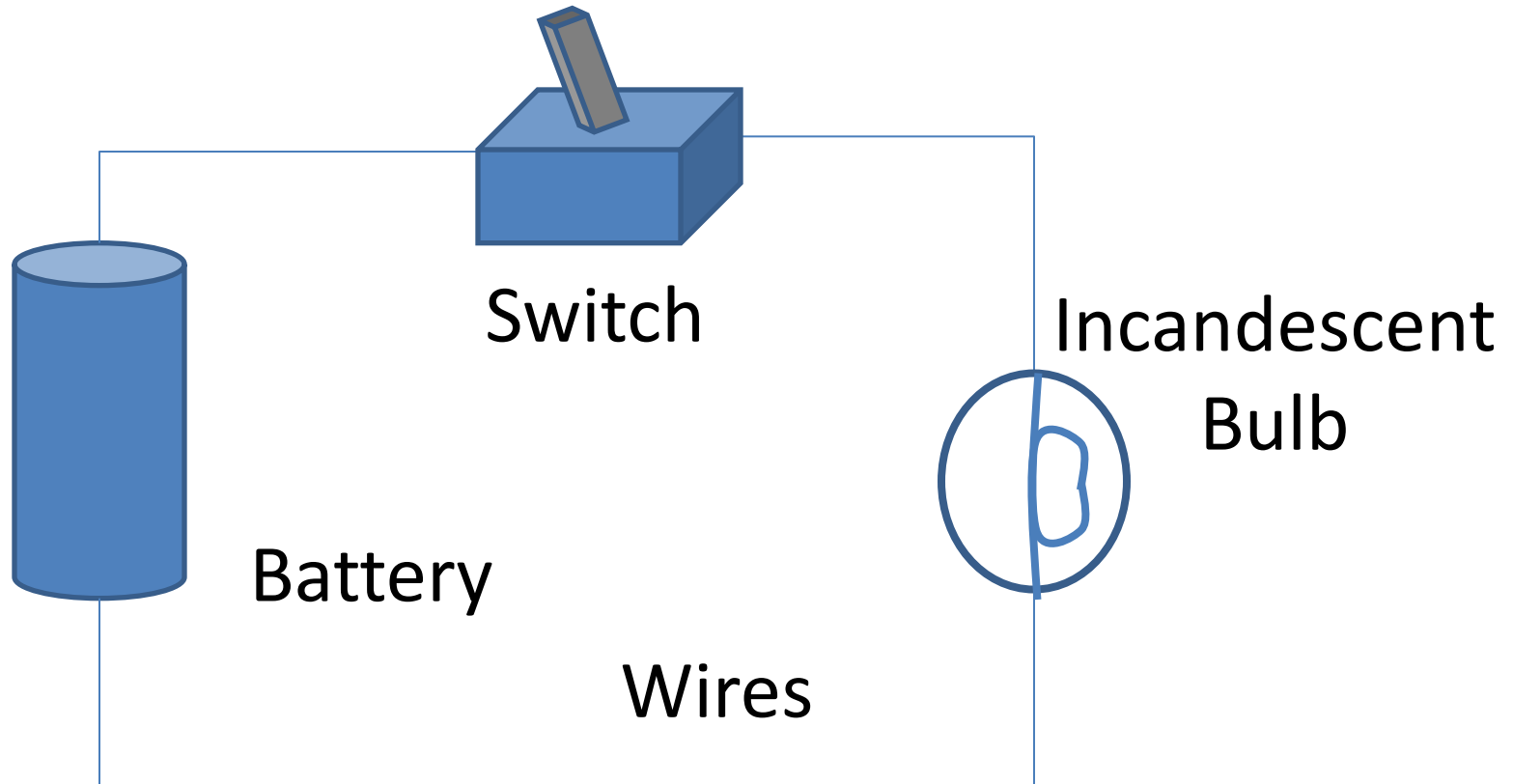
Why Study EE? (cont.)

- FE Exam Preparation—EE is at least 10% of the exam.
- Effective Communication—engineering teams throughout your career will include electrical engineers. Having a common framework is really a good idea.
- Career Flexibility—the future will reward adaptive, creative individuals who can learn and innovate.

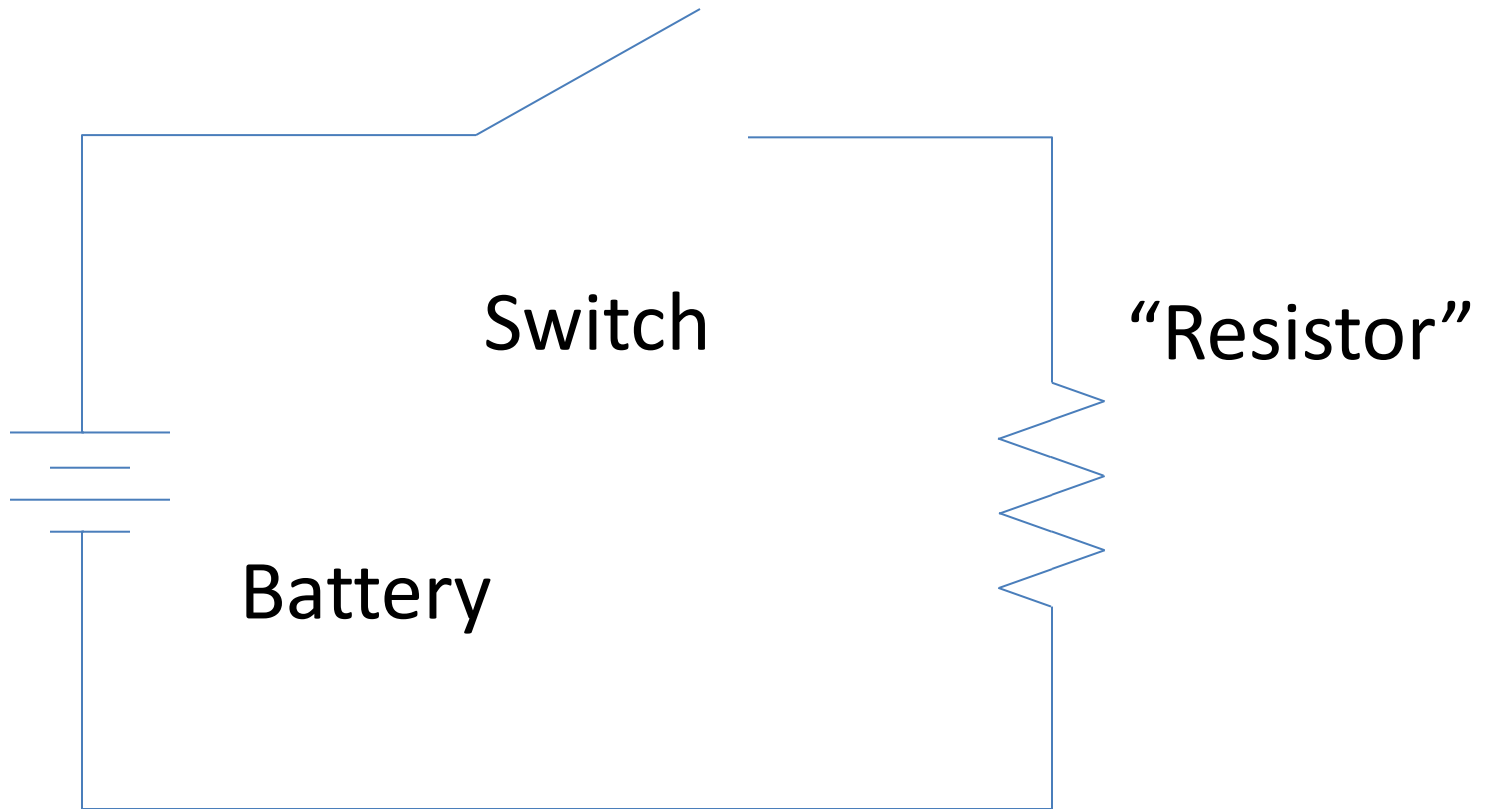
Electrical Circuits

- 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.

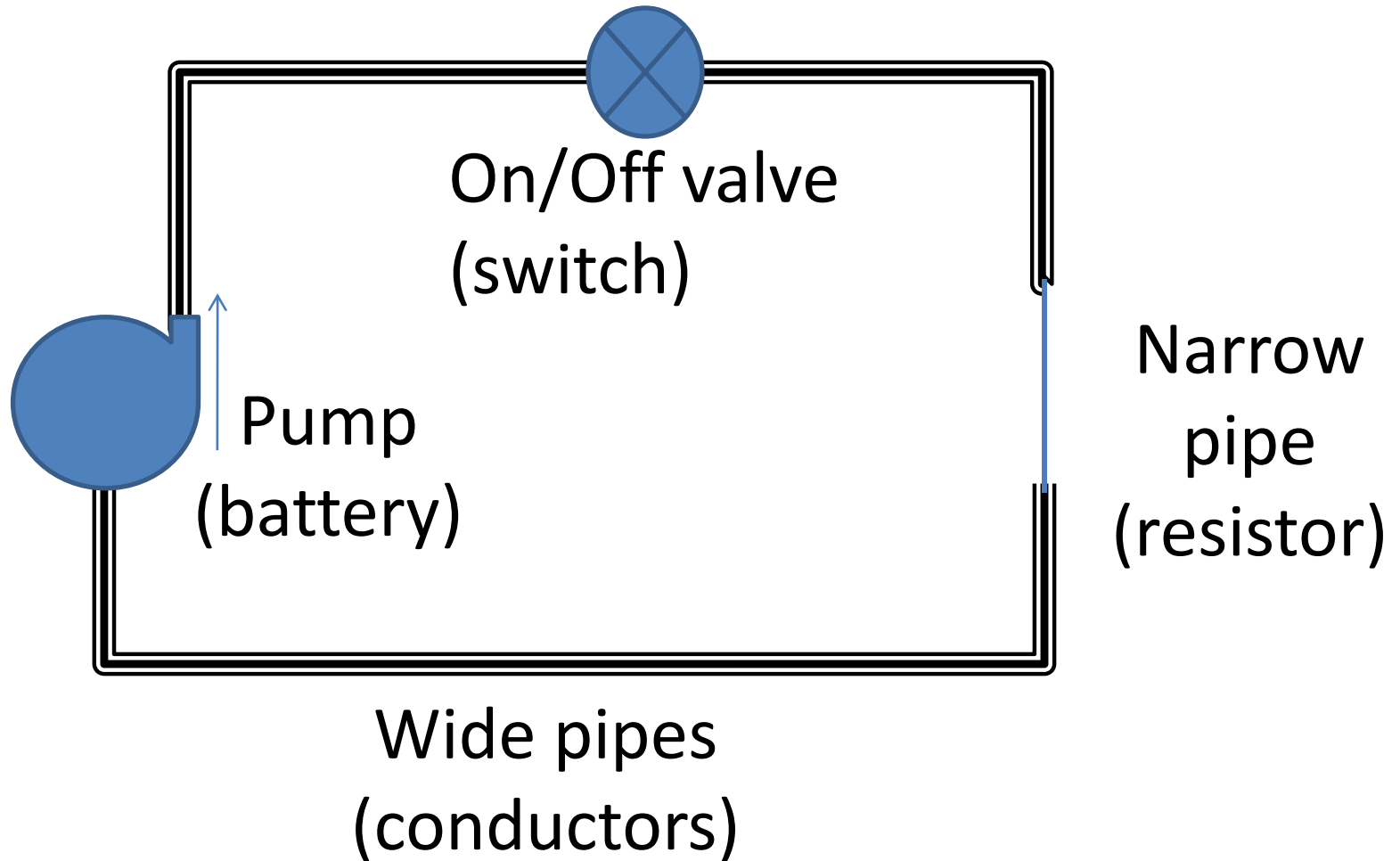
Electrical Circuits (cont.)



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 expressed by the named unit 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 with the named unit 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
 - = Amps x Volts
 - = [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