## Chapter Summary

**20.1. Current**
- Define electric current, ampere, and drift velocity
- Describe the direction of charge flow in conventional current.

**20.2. Ohm's Law: Resistance and Simple Circuits**
- Explain the origin of Ohm's law.
- Calculate voltages, currents, or resistances with Ohm's law.
- Explain what an ohmic material is.
- Describe a simple circuit.

**20.3. Resistance and Resistivity**
- Explain the concept of resistivity.
- Use resistivity to calculate the resistance of specified configurations of material.

**20.4. Electric Power and Energy**
- Calculate the power dissipated by a resistor and power supplied by a power supply.
- Calculate the cost of electricity under various circumstances.

**21.1. Resistors in Series and Parallel**
- Draw a circuit with resistors in parallel and in series.
- Calculate the voltage drop of a current across a resistor using Ohm's law.
- Contrast the way total resistance is calculated for resistors in series and in parallel.
- Explain why total resistance of a parallel circuit is less than the smallest resistance of any of the resistors in that circuit.
- Calculate total resistance of a circuit that contains a mixture of resistors connected in series and in parallel.

**21.4. DC Voltmeters and Ammeters**
- Explain why a voltmeter must be connected in parallel with the circuit.
- Draw a diagram showing an ammeter correctly connected in a circuit.
- Explain why measuring the voltage or current in a circuit can never be exact.

## Key Equations

$$I = \frac{\Delta Q}{\Delta t} \qquad\qquad I = \frac{V}{R}$$

$$R_{eq\ series} = \sum_{i=1}^{n} R_i \qquad\qquad \frac{1}{R_{eq\ parallel}} = \sum_{i=1}^{n} \frac{1}{R_i} \qquad\qquad R = \frac{\rho L}{A}$$

$$P = IV = \frac{V^2}{R} = I^2 R$$

## Multiple Choice  (Approx 15-20)

- Units for the parameters in the key equations and electrical usage
- Find equivalent resistance
- Figure out what happens to equivalent resistance when a third resistor is added to two existing resistors (in series and in parallel)
- Ohm's Law
- Identify ohmic behavior on a current versus voltage graph
- Identify the direction of current in a circuit
- Relationship between resistance, resistivity, cross-sectional area and length of a conductor and how a change in any of these parameters affects current
- Relationship of total current and individual currents through resistors (in series and in parallel)
- Relationship between power supply voltage and potential drop across resistors (in series and in parallel)

## Problems  (Approx 5-8)

- Practice problems in class
- Finding the cost to run an appliance or light for a month given power, time and cost of energy
- Calculating current through resistors in series, parallel or a combination
- Calculating the power dissipated as heat in a resistor in series, parallel or a combination
- Calculate current given the resistivity and dimensions of a conductor and the potential difference across the conductor