

**Course Objectives/Course Outline**  
**Spokane Community College**

---

---

**Course Title:** AC Theory

**Prefix and Course Number:** ELMT 123

---

**Course Learning Outcomes:**

**By the end of this course, a student should be able to:**

- define various concepts of alternating voltage and current.
- define inductance, capacitance, and calculate inductive and capacitive reactance.
- define effective voltage and effective current and use Ohm's law in purely resistive, purely inductive, and purely capacitive circuits.
- understand the effects of inductance, capacitance, and resistance in a circuit.

**Course Outline:**

- I. Alternating Current
  - A. Uses
  - B. Electric Power Transmission
  - C. Characteristics
    1. frequency
    2. wave length
    3. phase and phase difference
    4. values of AC voltage and current
      - a. peak
      - b. average
      - c. effective
  - D. An AC Generator
    1. voltage and current production
- II. AC Waveforms
  - A. Angle Motion/Displacement
  - B. AC vs. DC Waveforms
  - C. Sine Waves
    1. generation
  - D. Square Waves
    1. generation
  - E. Sawtooth Waves
  - F. Fluctuating DC
  - G. Trigonometric Functions
  - H. Vectors
    1. definition
    2. working with vectors
- III. Resistive AC Circuits
  - A. Current and Voltage
  - B. Phase Relationships
  - C. Power
  - D. Eddy Currents and Skin Effect
  - E. Solving Problems
  - F. Circuit Diagrams
  - G. Troubleshooting
- IV. Effects of Electromagnetism
  - A. Magnetic Field Around a Conductor

- B. Induced EMF
  - 1. determining factors
- C. Magnetic Fields Created by DC
- D. Self-Induction
- E. Magnitude of Self-Induced EMF
- F. Effect of Conductor Shape
- V. Induction
  - A. Inductors
  - B. Factors Determining Induction
  - C. Values
- VI. Inductive AC Currents
  - A. Inductive Reactance
  - B. Series and Parallel Inductors
  - C. Solving Problems
- VII. Capacitive Circuits
  - A. Charging a Capacitor
  - B. Units of Capacitance
  - C. Plate Surface Area
  - D. Dielectric
  - E. Voltage Relationships
  - F. Series and Parallel Capacitors
- VIII. Resonance Circuits
  - A. Power Factor Calculation
  - B. Component Installation
  - C. Graph Leading and Lagging Power Factors
  - D. Circuit Characteristics
- IX. Lab Experiments
  - A. Fuse Testing
  - B. Circuit Diagrams and Troubleshooting
  - C. Series Circuits
    - 1. resistive
    - 2. inductive
    - 3. capacitive
    - 4. resistive and inductive
    - 5. resistive and capacitive
    - 6. inductive and capacitive
    - 7. resistive, inductive, and capacitive
  - D. Parallel Circuits
    - 1. resistive
    - 2. inductive
    - 3. capacitive
    - 4. resistive and inductive
    - 5. resistive and capacitive
    - 6. inductive and capacitive
    - 7. resistive, inductive, and capacitive
  - E. Combination Series/Parallel Circuits
  - F. Resonance Circuits
    - 1. series
    - 2. parallel
  - G. Power Factor Correction
    - 1. static capacitors
  - H. AC Meter Connections

Print Date: 7/29/14

1. voltmeters
2. ammeters
3. wattmeters