

Course Objectives/Course Outline
Spokane Community College

Course Title: Electrical Basics

Prefix and Course Number: ELMT 102

Course Learning Outcomes:

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

- Be familiar with electrical terms
- Describe the structure of an atom
- List six methods of producing electricity
- Explain the basic electrical concepts of current, voltage, and resistance
- Identify the functions of conductors and insulators
- Use meters to measure voltage, current and resistance
- Identify and describe the characteristics of a series circuit
- Identify and describe the characteristics of a parallel circuit
- Understand the principles of Ohm's Law
- Calculate electrical values using Ohm's Law
- Have a basic understanding of the inherent dangers of electricity
- Develop safety awareness when working on or around electricity
- Recognize basic hazards when working around electrically powered machinery
- Understand and demonstrate the concepts of lock out, tag out

Course Outline:

- I. Introduction
 - A. Grading
 - B. Attendance
 - C. Safety
 - D. Work Place Ethics
- II. Atomic Structure
 - A. Nucleus
 - B. Proton
 - C. Electron
- III. Electron Theory
 - A. Electron Orbits
 1. Orbital shells
 2. Shell capacity
 - B. The Valance Shell
 - C. Electron Energy
 - D. Magnetism
 - E. Producing Electricity
 - F. Conductors
 - G. Insulators
- IV. How Electricity is Produced
 - A. Friction
 - B. Chemicals
 - C. Pressure

- D. Heat
- E. Light
- F. Magnetism
- V. Circuit Characteristics
 - A. Concepts of Voltage
 - B. Concepts of Current
 - C. Concepts of Resistance
 - D. Concepts of Power
- VI. Ohm's Law
 - A. Equations
 - B. Calculating Current
 - C. Calculating Resistance
 - D. Calculating Voltage
- VII. Electrical Power
 - A. Equations
 - B. Calculating Power
- VIII. The Electric Circuit
 - A. Power Sources
 - B. Loads
 - C. Control of Current
 - 1. Switches
- IX. Series Circuits
 - A. Series Loads
 - B. Series Power Sources
 - C. Series-Opposing Power Sources
 - D. Power Consumption
 - E. Voltage Drops
 - F. Open Circuits
 - G. Short Circuits
- X. Resistance
 - A. Units of Resistance
 - B. Wire
 - C. Loads
 - D. Measuring Resistance
 - 1. Connecting the Meter
 - 2. Using the Ohmmeter to Troubleshoot
- XI. DC Characteristics
 - A. DC Generation
 - 1. Generators
 - 2. Rectification
 - 3. Filtering
 - 4. Power Supplies
- XII. AC Characteristics
 - A. AC Voltage Generation
 - B. Sine Wave
 - 1. RMS

- 2. Peak Values
- C. Frequency and Phase
 - 1. Single Phase Power Concepts
 - 2. Three Phase Power Concepts
- D. Inductance and Inductors
- E. Capacitance and Capacitors
- F. Impedance
- XIII. Basic Switching and Practical Applications
 - A. SPST Switches
 - B. 3 Way Switches
 - C. 4 Way Switches
 - D. Duplex Receptacles
- XIV. Meters and Practical Applications
 - A. Measuring Current
 - 1. Connecting the Meter into the Circuit
 - 2. Clamp-on Ammeter
 - B. Measuring Voltage
 - 1. Connecting the Meter into the Circuit
 - 2. Non-Contact Testers
 - C. Measuring Resistance
 - 1. Connecting the Meter to Measure Resistance
- XV. Electrical safety
 - A. Shock Hazards
 - B. Arc Flash Hazards
- XVI. Machine Safety and Awareness
 - A. Electrical Lockouts
 - 1. Power Off
 - 2. Power Locked Off
 - B. Personal Protective Equipment
 - 1. Safety glasses
 - 2. Clothing
- XVII. Lock out, Tag out
 - A. Safety
 - B. Procedures