Course Title: Fundamentals of Electricity in HVAC/R  
Prefix and Course Number: AIRC 103  

Course Learning Outcomes:

By the end of this course, a student should be able to:
- Describe major concepts of basic electrical theory
- Describe Ohm's Law and its usage
- Solve problems using Ohm's Law in series, parallel, and series-parallel circuits
- Explain alternating current and direct current, and describe the differences between them
- Describe the operation and usage of capacitors, inductors, transformers, relays and contactors, and circuit protection devices
- Identify the electrical symbols used in schematic diagrams, and the components they represent
- Read and use basic wiring diagrams, including label diagrams and schematic diagrams
- Construct and analyze simple schematic diagrams
- Identify electrical safety procedures

Course Outline:

1. Fundamental Concepts of Electricity
   a. Structure of an atom
   b. Movement of electrons
   c. Electric current
   d. Conductors and insulators
   e. Electromotive force
2. Fundamental Concepts of Magnetism
   a. Basic laws of magnetism
   b. Magnetic fields
   c. Electromagnets
   d. Magnetic shielding, lines of force, magnetic flux, self-inductance, mutual induction, and counter electromotive force
3. Fundamental Concepts of Alternating and Direct Current
   a. Voltage, amperage, resistance, and wattage
   b. Ohm’s Law
   c. Peak-to-peak, RMS, and average voltage values
   d. Phase relationships
   e. Inductive reactance, capacitive reactance, and impedance
   f. Power factor
4. Series and Parallel Circuits
   a. Application of Ohm's Law in series, parallel, and series-parallel circuits
   b. Power
5. Electrical Symbols and Schematic Diagrams
   a. Component symbols
   b. Wiring diagrams
   c. Schematic diagrams
d. Reading and usage of schematic and wiring diagrams

6. Electrical Components
   a. Capacitors and capacitance
   b. Inductors and inductance
   c. Transformers
   d. Relays and contactors

7. Electrical Safety
   a. Safety procedures and PPE
   b. Grounding
   c. GFCI
   d. Lockout/tagout