HVAC A101: BASIC ELECTRICAL FOR HVAC-R

Item	Value
Curriculum Committee Approval Date	11/13/2024
Top Code	094600 - Environmental Control Technology
Units	3 Total Units
Hours	72 Total Hours (Lecture Hours 45; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

Basic electrical theory & application. Students will build a variety of series and parallel circuits using switches, contactors, relays, thermostats, transformers and other controls used in the HVAC-R field in addition to using miscellaneous electrical components. ADVISORY: HVAC A100. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Demonstrate the proper use of digital and analog meters to test a variety of HVACR components.
2. Explain system loads and their effect on circuit design.
3. Successfully diagnose basic HVACR faults.

Course Objectives

- 1. Demonstrate the proper use of digital meters.
- 2. Demonstrate the proper use and application of analog meters.
- 3. Demonstrate the proper use of thermostats.
- 4. Compare and contrast series and parallel circuits.
- 5. Explain current flow in series/parallel circuits.
- 6. Explain and demonstrate the use of low and high voltage systems.
- 7. Install a low voltage thermostat.
- 8. Wire a basic refrigeration system.
- 9. Troubleshoot a basic refrigeration system.
- 10. Identify and explain use of different types of motors, switches, relays, contactors, and other components used in HVACR systems.

Lecture Content

Electrical Safety Basic Electricity Electric Circuits Electric Meters Components, Symbols, and Circuitry of Air Conditioning Wiring Diagrams Alternating Current, Power Distribution, and Voltage Systems Contactors, Relays and Overloads Thermostats, Pressure Switches, and Other Electric Control Devices Basic Troubleshooting Electric Control Devices

Lab Content

See Course Content.

Method(s) of Instruction

- Lecture (02)
- Lab (04)

Instructional Techniques

Lecture and hands on demonstrations.

Reading Assignments

Reading Chapter/Units from Text Electricity for Refrigeration, Heating and Air Conditioning. 2-3 hours per week.

Writing Assignments

Written description of an electrical circuit and hands on identification of all components and how they are interdependent on each other. Hands on assembly of an electrical circuit using a multi-meter, thermostat, transformer, contactor, relay and motors. 1-3 hours per week.

Out-of-class Assignments

Complete Review Question after each Chapter/Unit from Text Electricity for Refrigeration, Heating and Air Conditioning. 3-4 hours per week

Demonstration of Critical Thinking

Written testing comprised of multiple choice, true/false, fill in the blanks and hands on demonstrations of the equipment.

Required Writing, Problem Solving, Skills Demonstration

Written description of an electrical circuit and hands on identification of all components and how they are interdependent on each other. Hands on assembly of an electrical circuit using a multi-meter, thermostat, transformer, contactor, relay and motors.

Eligible Disciplines

Air conditioning, refrigeration, heating (solar energy technician): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Instructional design/technology: Master's degree in instructional design/ technology or educational technology OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Smith, Russell E.. Electricity for Refrigeration, Heating and Air Conditioning, 11th ed. Chicago: Thomson/Delmar Learning Center, 2022 Rationale: latest