

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Heating, Ventilation, Air Conditioning & Refrigeration Technology Program
Revision Date: August 2025

I. CATALOG DESCRIPTION

Course Number: HVAC1109
Course Title: Electrical Theory/Lab
Prerequisite(s): None
Catalog Description: Study of basic electricity for use in the HVAC/R trades with emphasis on AC voltage, electrical symbols, Ohm law, Kirchoff's voltage and current laws, capacitors, transformers, contactors, relays, and developing wiring schematics. Hands-on lab constructing various circuits.

Credit Hours: 4
Class Hours: 45
Lab Hours: 45
Total Contact Hours: 90

II. COURSE OBJECTIVES: *Course will:*

- A. Describe basic electrical principles of resistance, voltage, current, and power in multiple types of electrical circuits
- B. Explain different types of diagnostic meters for testing electrical circuits
- C. Review concepts of capacitors, inductors, and transformers
- D. Calculate voltage, current, resistance, and power of circuits
- E. Recognize different types of electrical motors found in HVAC/R circuits
- F. Explain fundamental concepts of reading schematics that apply to HVAC/R circuits

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Read and explain different wiring diagrams.
 - 2. Draw electrical schematic circuits.
 - 3. Demonstrate usage of Volt, Ohm, Milliamp and Clamp-On Amp meter.
 - 4. Test and record voltage, amperage, and ohms.
 - 5. Translate pictorial drawing into a working circuit on a lab trainer.
 - 6. Identify switch and load components in an electrical circuit.
 - 7. Compare the differences between a Series and Parallel circuit.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #3: Critical Thinking & Problem Solving
Outcome 5: Acquire and integrate knowledge and construct relationships across disciplines.

IV. CONTENT/TOPICAL OUTLINE

- A. Electrical Fundamentals
 - 1. atomic structure, law of charges, conductors, insulators, voltage, current, resistance, power
- B. Test Equipment
 - 1. multi-meters and clamp-on ammeters
- C. Series Circuits
- D. Parallel Circuits
- E. Combination Circuits

- F.** Capacitors, Inductors, & Transformers
- G.** Motors
 - 1. different types of motors for different applications
- H.** Control devices
 - 1. thermostat, pressure & float controls, relay, contactor, motor starter
- I.** Schematics development

V. INSTRUCTIONAL MATERIALS

- A.** Required Text(s): Electric Skills for HVACR Theory and Labs
- B.** Supplies: Scientific Calculator, Colored Pencils, and a 12" Ruler

VI. METHODS OF PRESENTATION/INSTRUCTION

- A.** Methods of presentation typically include a combination of the following:
 - 1. Lectures
 - 2. Classroom demonstrations
 - 3. Classroom discussions
 - 4. Hands-on lab projects
 - 5. Lab demonstrations
 - 6. Instructional handouts
 - 7. Video presentations

VII. METHODS OF EVALUATION

- A.** Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Tests
 - 2. Quizzes
 - 3. Lab Projects

VIII. SPECIFIC COURSE REQUIREMENTS

- A.** Student must meet all of the following to receive a passing grade:
 - 1. Submit own work. Students turning in homework, reports, field notes, or calculations by someone other than themselves will receive 0% and be referred to the Division Dean and Dean of Students for further disciplinary action. Consequences can include failing the course.
 - 2. Demonstrate attitude, skills, and character commensurate with industry standards.
 - 3. All program policies of the Heating, Ventilation, Air Conditioning, & Refrigeration Technology program will be strictly enforced.