

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

I. CATALOG DESCRIPTION

Course Number: HVAC1363
Course Title: Heat Pump Systems
Prerequisite(s): HVAC1109
Catalog Description: The study of components, controls, system design, installation, troubleshooting, start-up, standard service procedures, wiring diagrams, and annual operating costs.
Credit Hours: 2
Class Hours: 15
Lab Hours: 45
Total Contact Hours: 60

II. COURSE OBJECTIVES: *Course will:*

- A. Describe heat pump concepts.
- B. Explain controls unique to heat pumps.
- C. Identify types of heat pump systems.
- D. Distinguish heat pump installation including outdoor/indoor section location, proper installation of refrigerant lines, condensate drain, post-installation, and startup checks.
- E. Interpret heat pump wiring diagrams.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Examine the operation of heat pumps in heating and cooling modes.
 - 2. Differentiate different controls used for heat pump systems.
 - a. Fossil fuel controls
 - b. Thermostats
 - c. Defrost controls
 - 3. Analyze different types of heat pump systems.
 - a. Air Source
 - b. Geothermal
 - 4. Recognize heat pump installation including outdoor/indoor section location, proper installation of refrigerant lines, condensate drain, post-installation, and startup checks.
 - 5. Examine heat pump wiring diagrams.
 - 6. Prepare wiring diagrams of heat pumps.
 - 7. Perform operational test on heat pumps in heating and cooling modes.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #3: Critical Thinking & Problem Solving
Outcome 1: Collect, identify, interpret and analyze data.

IV. CONTENT/TOPICAL OUTLINE

- A. Basic Principles
- B. Components
- C. Air Source Heat Pumps
- D. Water Source Heat Pumps

- E. Application
- F. Installation
- G. Startup, Checkout, Adjustment
- H. Refrigeration Troubleshooting
- I. Electrical Troubleshooting

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): RSES, *Heat Pump Course Volume 1 & 2*
- B. Other Resources: Manufacturers' Materials (provided by instructor)

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. Instructional handouts
 - 5. Video presentations
 - 6. PowerPoint 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. Achieve a passing grade of "D" (60%) or higher, based on SCC grading scale
 - 2. 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.
 - 3. Demonstrate attitude, skills, and character commensurate with industry standards.