

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

I. CATALOG DESCRIPTION

Course Number: HVAC1461
Course Title: Residential Controls II
Prerequisite(s): HVAC1330
Catalog Description: Study of high efficiency, condensing gas fired furnaces. Includes solid-state controls, special control applications and different mechanical devices such as humidifiers, electronic air cleaners, BLUETOOTH and programmable thermostats. Firing rates, efficiency measuring, venting and installation procedures presented with hands-on lab.
Credit Hours: 3.0
Class Hours: 30
Lab Hours: 45
Total Contact Hours: 75

II. COURSE OBJECTIVES: *Course will:*

- A. Explain integrated control systems.
- B. Outline basic installation and operation of plus 80%, plus 90%, condensing furnaces.
- C. Explain sequence of operation and controls for intermittent ignition gas furnaces.
- D. Describe humidifiers, humidistats, and electronic air filters – power, PH control of condensation and disposal.
- E. Explain solid-state electronics theory, basic solid-state devices and applications.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Interpret the operation and components of condensing, non-condensing, and standing pilot furnaces.
 - 2. Perform testing using meters and tools on all types of gas furnaces.
 - 3. Identify the components of humidifiers, humidistats, and electronic air cleaners.
 - 4. Analyze solid-state components and their applications.
 - 5. Associate the controls used for intermittent ignition systems on gas furnaces.
 - 6. Perform sequence of operation testing for electronic ignition systems for gas furnaces.
- 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. Retrofit/Conversion Kits
- B. Solid-State and Programmable Thermostats
- C. Install, Startup, Operation, and Troubleshooting
- D. Furnace Types, Parts and Classifications - 80% and 90% Furnaces
- E. Furnace Sequencing
- F. Electronic Ignition
- G. Humidifiers/Humidistats
- H. Electronic Air Cleaners

- I.** Solid-State Fundamentals, Components and Operation
- J.** Gas Valves and Pressure Regulators
- K.** Pilot and Pilot Safeties
- L.** Use of Schematics

V. INSTRUCTIONAL MATERIALS

- A.** Required Text(s): No required text. Handouts (provided by instructor).
- B.** Other Resources: Manufacturers' Materials (provided by instructor) and Student notes from previous HVAC courses

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.** Test
 - 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.