# APRT 140A: ELECTRICAL BASICS FOR RESIDENTIAL HVAC SERVICE I

## Foothill College Course Outline of Record

| Heading | Value |
|---|---|
| **Effective Term:** | Summer 2025 |
| **Units:** | 3 |
| **Hours:** | 30 lecture, 24 laboratory per quarter (54 total per quarter) |
| **Prerequisite:** | Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Residential Service Apprenticeship Program. |
| **Degree & Credit Status:** | Degree-Applicable Credit Course |
| **Foothill GE:** | Non-GE |
| **Transferable:** | None |
| **Grade Type:** | Letter Grade (Request for Pass/No Pass) |
| **Repeatability:** | Not Repeatable |

## Student Learning Outcomes

- A student will be able to identify basic residential gas furnace components and their functions.
- A student will be able to identify heat-cool, heat only, and cool only thermostats.

## Description

Development of basic skills necessary for service technicians to service heating and air conditioning equipment with special emphasis on the basics of electricity and air filtration.

## Course Objectives

The student will be able to:

1. Describe alternating and direct electrical current.
2. Take voltage, amperage, and ohm readings on simplified electrical circuits.
3. Identify heat-cool, heat only, and cool only thermostats.
4. Identify basic residential gas furnace components and their functions.
5. Demonstrate practical skills in sheet metal and air conditioning service work.
6. Explain replacement and cleaning decisions for common residential air filters.

## Course Content

1. Describe alternating and direct electrical current
   a. Definition of electricity and its relationship to the atom
   b. Definitions of A.C. and D.C. current
2. Take voltage, amperage, and ohm readings on simplified electrical circuits
   a. Explanation of voltage, amperage, and ohms
   b. Working safely with electricity
   c. Select and set up a multi-meter to take desired measurements
3. Identify heat-cool, heat only, and cool only thermostats
   a. Identify common thermostats and their functions
4. Identify basic residential gas furnace components and their functions
   a. Identify basic furnace components, functions, and relationship to other components
   b. Explain flow of electricity, combustion air, gas, exhaust, and conditioned air through basic furnace system components
5. Demonstrate practical skills in sheet metal and air conditioning service work
   a. Disconnect and/or lockout, tagout electrical source
   b. Safely open access to circuits as needed
   c. Visual check for electrical hazards, evidence of circuit overloads, disconnections, shorts, or other problems
   d. Practice safe techniques and troubleshooting sequence in using meters and other devices to verify circuit conditions
6. Explain replacement and cleaning decisions for common residential air filters
   a. Air filtration fundamentals
   b. Document and report to supervisor or customer

## Lab Content

1. Identify components of heating and air conditioning equipment
2. Practice safety techniques with electrical systems
3. Perform electrical measurements for servicing

## Special Facilities and/or Equipment

Laboratory equipped with air conditioning equipment.

## Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Results of written quizzes and tests
Satisfactory completion of shop projects
Comprehensive written final examination
Maintenance of a workbook of student's daily work activities

## Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
Discussion
Laboratory
Demonstration

## Representative Text(s) and Other Materials

International Training Institute for the Sheet Metal and Air Conditioning Industry. Residential HVAC Service Technician. 2007.

This is the standard Sheet Metal textbook/workbook used for this course. Although it is older than 5 years, it is the most current book used when teaching this course.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Readings from textbook
    a. Ohms and Power Law
2. Writing assignments given in the laboratory
    a. Complete the review item questions referring to electrical meters

## Discipline(s)

Air Conditioning, Refrigeration, Heating