

# APPT 152: RF 102 BASIC ELECTRICITY & REFRIGERATION

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2024
Units:	7
Hours:	72 lecture, 36 laboratory per quarter (108 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Air Conditioning & Refrigeration Technology Apprenticeship Program.
Advisory:	Not open to students with credit in APPR 132.
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 differentiate between series and parallel circuits.
- A student will be able to define Ohm's Law.
- A student will be able to describe fundamentals of the vapor compression cycle.

## Description

A review of laws pertaining to basic electrical theory and their application to mechanical equipment service. Also covers refrigeration theory and application of the vapor compression cycle.

## Course Objectives

The student will be able to:

1. Describe basic electrical fundamentals, including Ohm's Law and basic circuit types
2. List and explain the function of various electrical devices and components
3. Demonstrate the proper use of meters and simple components
4. Apply the fundamentals of physics and the vapor compression cycle

## Course Content

1. Fundamentals of electricity
  - a. Atomic theory
  - b. Ohm's Law
  - c. Power distribution
2. Electrical safety
  - a. Effects of human contact with electricity
  - b. Lock-out/tag-out procedures

- a. Digital and analog types
  - b. Voltmeter
  - c. Ammeter
  - d. Ohmmeter
3. Measuring instruments
    - a. Digital and analog types
    - b. Voltmeter
    - c. Ammeter
    - d. Ohmmeter
  4. Electrical circuits
    - a. Capacitive, inductive, and resistive loads
    - b. Series, parallel, and compound circuits
    - c. Fuses, breakers, and conductors
  5. Motors
    - a. Electrical motor types
    - b. Motor starters
    - c. Overload protection
    - d. Motor troubleshooting
  6. Electrical devices
    - a. Transformers
    - b. Solenoid valves
    - c. Switches and thermostats
  7. Wiring diagrams
    - a. Heating and cooling circuits
    - b. Heat pump circuits and controls
  8. Electrical troubleshooting techniques
    - a. Troubleshooting approach
    - b. Diagnosing and isolating faults
    - c. Troubleshooting exercises
  9. Science and math
    - a. States of matter
    - b. Pressure-temperature relationships
    - c. Areas and volume
    - d. Applied formulas
  10. Refrigeration theory
    - a. Refrigeration methods
    - b. Application of the vapor compression cycle

## Lab Content

Students will work individually and in teams on electrical troubleshooting projects.

## Special Facilities and/or Equipment

1. Personal protective equipment
2. Laboratory with HVACR service tools
3. When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address

## Method(s) of Evaluation

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

Results of written quizzes and final examination  
Satisfactory completion of hands-on projects  
Maintenance of a student's workbook with questions drawn from text

## Method(s) of Instruction

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

Lecture  
Lab assignment  
Group discussion  
Demonstration

## Representative Text(s) and Other Materials

Carrier Corporation. General Training Air Conditioning (Fundamentals) GTAC-I, Modules 1-4. 1993.

Carrier Corporation. General Training Electricity (Fundamentals) GTE-II, Modules 1-9. 1993.

International Pipe Trades Joint Training Committee. Basic Electricity. 2015.

Auvil, Ronnie J.. HVAC and Refrigeration Systems Training Manual. 2014.

Although these textbooks are older than 5 years, they conform to national training standards and are considered seminal works in the discipline. We will adopt the next edition of each text, as it is published.

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

1. Readings from textbook General Training Air Conditioning: Module 3
  - a. Lesson 2, Mechanical Refrigeration Components
2. Writing assignments given in the laboratory
  - a. Make a schematic drawing of a basic refrigeration system with components
  - b. Describe the refrigerant properties at each point in the system

## Discipline(s)

Air Conditioning, Refrigeration, Heating