

# APSM 152C: INTRODUCTION TO ELECTRICITY

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	2.5
Hours:	30 lecture, 10 laboratory per quarter (40 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal 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 successful student will be able to explain voltage, amperage, and resistance properties in electrical circuits.
- A successful student will be able to apply Ohm's Law to calculate voltage, amperage or resistance, when given a value for two of these factors.

## Description

Students receive an introduction to electricity as related to HVAC equipment, with an emphasis on safety when working with HVAC equipment.

## Course Objectives

The student will be able to:

- Define electricity
- Define magnetism
- Use an electrical multi-meter to take electrical measurements
- Define different types of current (AC/DC)
- Explain the different electrical circuits (series and parallel)
- Understand the different units of measurement for electricity (voltage, amperage, resistance)
- Understand the usage and application of Ohm's Law
- Explain electrical circuit protection and automatic controls
  - Apply electrical units of measure to conductor sizing
- Identify circuit components function and operation
- Read and draw wiring diagrams
  - Assemble a designated electrical circuit
- Explain purpose and function of primary and secondary voltages
- Perform troubleshooting on electrical circuits

## Course Content

- Define electricity
  - Describe the structure of an atom (Lec)
  - Identify atoms with a positive charge and a negative charge (Lec)
- Define magnetism
  - Describe how magnetism is used to create electricity (Lec)
  - Describe a solenoid (Lec)
  - Describe the construction of a transformer and the way a current is induced in a secondary circuit (Lec)
- Use an electrical multi-meter to take electrical measurements
  - List the units of measurement for electricity (Lec and Lab)
- Define different types of current (AC/DC)
  - State the difference between alternating current and direct current (Lec and Lab)
  - Describe a sine wave (Lec and Lab)
- Explain the different electrical circuits (series and parallel)
  - Explain the difference between series and parallel circuits (Lec and Lab)
- Understand the different units of measurement for electricity (voltage, amperage, resistance)
  - State the formula for determining electrical power (Lec and Lab)
  - Explain inductance (Lec and Lab)
- Understand the usage and application of Ohm's Law
  - State Ohm's Law (Lec and Lab)
- Explain electrical circuit protection and automatic controls (Lec)
  - Apply electrical units of measure to conductor sizing
    - State the reasons for using proper size wires (Lec and Lab)
    - Explain the characteristics that make certain materials good conductors and good insulators (Lec and Lab)
- Identify circuit components function and operation
  - Describe how a capacitor works (Lec and Lab)
  - Describe the physical characteristics and the function of several semiconductors (Lec and Lab)
- Be able to read and draw wiring diagrams (Lec and Lab)
  - Assemble a designated electrical circuit (Lec and Lab)
- Explain purpose and function of primary and secondary voltages (Lec)
  - Perform troubleshooting on electrical circuits
    - Describe procedures for making electrical measurements (Lec and Lab)

## Lab Content

- Assemble designated electrical circuits

## Special Facilities and/or Equipment

- Laboratory with sheet metal service tools
- Personal protective equipment
- 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 tests
- Responses in class discussions

Comprehensive written final examination  
Comprehensive final project  
Demonstration of assigned skills to acceptable level per instructor

## Method(s) of Instruction

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

Lecture  
Discussion  
Demonstration  
Lab assignments followed by discussion

## Representative Text(s) and Other Materials

Whitman, B., B. Johnson, J. Tomczyk, and E. Silberstein. Refrigeration and Air Conditioning Technology, 8th ed.. 2016.

Auvil, Ronnie J.. HVAC Controls Systems, 4th ed.. 2017.

These are the standard sheet metal textbooks/workbooks used for this course. Although one or more may not be within five years of the required published date, they are the most current books used when teaching this course.

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

- a. Sample reading assignment: From the Refrigeration and Air Conditioning Technology textbook, Unit 13, "Basic Electricity and Magnetism and Introduction to Automatic Controls"
- b. Sample writing assignment: Answer review questions related to the assigned reading

## Discipline(s)

Sheet Metal or Air Conditioning, Refrigeration, Heating