

# APSM 158A: INTRODUCTION TO DIRECT DIGITAL HVAC CONTROLS

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	2
Hours:	28 lecture, 12 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 the basic function of HVAC direct digital controls systems.
- A successful student will be able to review basic programming for a DDC control system.

## Description

Students are introduced to the components and principles that comprise a direct digital control system.

## Course Objectives

The student will be able to:

1. Identify various types of system architectures and components
2. Demonstrate knowledge of different grounding schemes
3. Demonstrate knowledge of various cables and connector types
4. Explain definitions of system programming terminology and understand the programming variables

## Course Content

1. Identify various types of system architectures and components
  - a. Demonstrate knowledge of system layouts and identify the different components within each tier and know their function (Lec and Lab)
  - b. Demonstrate knowledge of various buses (Lec and Lab)
  - c. Demonstrate knowledge of how to properly install and calibrate system sensors as well as know their functions and capacities within the system (Lec and Lab)
2. Demonstrate knowledge of different grounding schemes
  - a. Demonstrate the ability to identify different grounding schemes (Lec and Lab)

- b. Demonstrate the ability to install the correct grounding for different system (Lec and Lab)
3. Demonstrate knowledge of various cables and connector types
    - a. Demonstrate knowledge of different cable types and connectors commonly used in DDC systems (Lec and Lab)
    - b. Understand the effects of long wire runs on DDC sensors and other devices (Lec and Lab)
    - c. Demonstrate knowledge of connectors commonly used for specific functions (Lec and Lab)
    - d. Demonstrate the ability to de-pin and re-pin various connectors (Lec and Lab)
    - e. Demonstrate the ability to test various cables (Lec and Lab)
  4. Explain definitions of system programming terminology and understand the programming variables
    - a. Demonstrate knowledge of various terms used in DDC systems (Lec and Lab)
    - b. Demonstrate the knowledge of various programming variables within a DDC system (Lec and Lab)

## Lab Content

1. Demonstrate the ability to install the correct grounding for different systems

## Special Facilities and/or Equipment

1. Laboratory with sheet metal service tools
2. Personal protective equipment
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 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**

1. Sample reading assignment: From the Refrigeration and Air Conditioning Technology textbook, Section 16.6, "Direct Digital controls (DDCs)"
2. Sample writing assignment: Answer review questions related to assigned reading

## **Discipline(s)**

Sheet Metal or Air Conditioning, Refrigeration, Heating