APSM 175B: DDC CONTROLS & PROGRAMS

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	2
Hours:	24 lecture, 16 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 describe the basic DDC logic functions.
- A successful student will be able to write a DDC block program for HVAC control functions.

Description

Students will gain an overview of direct digital control systems used in HVAC systems. Students will program and produce control documentation for a packaged rooftop HVAC system.

Course Objectives

The student will be able to:

1. Describe the control loop process
2. Describe the basic logic functions
3. Describe analog and digital functions
4. Identify components used in DDC functions
5. Describe minimum requirements of a DDC system for HVAC
6. Write a written program logic for basic HVAC functions
7. Write a DDC control sequence of operation for basic HVAC functions
8. Draw a graphic schematic of a HVAC control system
9. Write a DDC block program for HVAC control function

Course Content

1. Describe the control loop process
   a. Describe the key elements and functions in a control loop (Lec and Lab)
2. Describe the basic logic functions
   a. Describe the basic logic functions: OR, AND, IF/THEN
3. Describe analog and digital functions
   a. Describe the attributes of analog and digital inputs for HVAC control systems (Lec and Lab)
   b. Describe the attributes of analog and digital outputs for HVAC control systems (Lec and Lab)
4. Identify components used in DDC functions
   a. Identify the main components in a DDC HVAC control system (Lec and Lab)
   b. Describe the function of the main components in a DDC HVAC control system (Lec and Lab)
5. Describe minimum requirements of a DDC system for HVAC
   a. Describe minimum functional requirements of a DDC system for HVAC control (Lec and Lab)
6. Write a written program logic for basic HVAC functions
   a. Compose a written program logic for fan runtime control (Lec and Lab)
   b. Compose a written program logic for discharge temperature control (Lec and Lab)
   c. Compose a written program logic for fan static pressure control (Lec and Lab)
7. Write a DDC control sequence of operation for basic HVAC functions
   a. Compose a written DDC control sequence of operation for fan runtime control (Lec and Lab)
   b. Compose a written DDC control sequence of operation for discharge temperature control (Lec and Lab)
   c. Compose a written DDC control sequence of operation for fan static pressure control (Lec and Lab)
8. Draw a graphic schematic of a HVAC control system
   a. Compose a DDC graphic schematic of operation for fan runtime control (Lec and Lab)
   b. Compose a DDC graphic schematic of operation for discharge temperature control (Lec and Lab)
   c. Compose a DDC graphic schematic of operation for fan static pressure control (Lec and Lab)
9. Write a DDC block program for HVAC control function
   a. Describe the block program functions in a DDC program (Lec and Lab)
   b. Compose a DDC block program for fan runtime control (Lec and Lab)
   c. Compose a DDC block program for discharge temperature control (Lec and Lab)
   d. Compose a DDC block program for fan static pressure control (Lec and Lab)

Lab Content

1. Compose a DDC block program for discharge temperature control
2. Apply DDC programs composed by students to actual equipment performance

Special Facilities and/or Equipment

1. Laboratory with sheet metal test and balance tools and sample system components
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 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

International Training Institute for the Sheet Metal and Air Conditioning Industry. Testing, Adjusting & Balancing of Environment Systems. 2003.

International Training Institute for the Sheet Metal and Air Conditioning Industry. Direct Digital Controls. 2003.

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 textbook, assigned sections on DDC controls
2. Sample writing assignment: Compose a written program logic for fan static pressure control

Discipline(s)

Sheet Metal