APSM 173B: TEMPERATURE MEASUREMENTS, DUCT SYSTEMS & BASIC CONTROLS

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	2.5
Hours:	32 lecture, 8 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 process of field verifying a thermometers accuracy.
- A successful student will be able to describe the characteristics of pressure dependent and pressure independent VAV systems.

Description

Students will gain an understanding of a variety of temperature measurements, the use of temperature measurement instruments, basic overview of HVAC duct systems and the control devices used to regulate temperature and humidity in HVAC systems.

Course Objectives

The student will be able to:

1. Discuss procedures used to take temperature measurements using various instruments
2. Describe the process of field verifying a thermometer's accuracy
3. Define the types of duct systems used in HVAC
4. Identify the common symbols representing duct components on HVAC drawings
5. Identify and illustrate the difference between single and dual path duct systems
6. Describe the characteristics of pressure dependent and pressure independent VAV systems
7. Describe the main functions of HVAC control systems
8. Describe the three main elements of a control loop
9. Describe the types of control loop inputs and outputs
10. Describe a device's control action and normal state
11. Describe various control devices and their functions

Course Content

1. Discuss procedures used to take temperature measurements using various instruments
   a. Determine the proper scale of the thermometer (Lec)
   b. Describe types of thermometers used in HVAC testing (Lec)
   c. Describe common procedure to take temperature readings in air (Lec)
   d. Describe common procedure to take temperature readings in liquids (Lec)
2. Describe the process of field verifying a thermometer's accuracy
   a. Describe ice bath field accuracy check (Lec and Lab)
3. Define the types of duct systems used in HVAC
   a. Define supply air, return air, exhaust air, relief air and ventilation air (Lec and Lab)
4. Identify the common symbols representing duct components on HVAC drawings
   a. Identify and illustrate the common symbols representing duct components on HVAC (Lec and Lab)
5. Identify and illustrate the difference between single and dual path duct systems
   a. Describe the characteristics used to describe duct systems (Lec and Lab)
   b. Identify and illustrate single and dual path duct systems (Lec and Lab)
6. Demonstrate an understanding of pressure dependent and pressure independent VAV systems
   a. Define the characteristics of a VAV system (Lec and Lab)
   b. Describe the characteristics of pressure dependent vs. pressure independent VAV systems (Lec and Lab)
7. Describe the main functions of HVAC control systems
   a. Describe the main functions of HVAC control systems (Lec and Lab)
8. Describe the three main elements of a control loop
   a. Describe the three main elements of a control loop (Lec and Lab)
9. Describe the types of control loop inputs and outputs
   a. Describe analog and digital loop inputs and outputs (Lec and Lab)
10. Describe a device's control action and normal state
    a. Describe a device's control action and normal state (Lec and Lab)
11. Describe various control devices and their functions
    a. Describe various control devices and their functions in an HVAC system (Lec and Lab)

Lab Content

1. Demonstrate selection, scale and proper use of a variety of thermometers used in the HVAC industry
2. Field verify the accuracy of a thermometer

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 written final examination
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.

This is the standard sheet metal textbook/workbook used for this course. Although it may not be within five years of the required published date, 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. Sample reading assignment: From the textbook, section on temperature measurements
2. Sample writing assignment: Identify the common symbols representing duct components on HVAC drawings

Discipline(s)

Sheet Metal