

APSM 172A: BASIC HVAC SYSTEMS, PSYCHROMETRICS, AIR PRESSURES & MEASUREMENTS OF AIR

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 measure common pressures in an HVAC system.
- A successful student will be able to measure airflow in HVAC systems using various instruments.

Description

Students will confirm an understanding of the main characteristics of psychrometrics and methods to measure airflow in commercial HVAC systems.

Course Objectives

The student will be able to:

1. Describe the purpose of commercial HVAC systems
2. Identify the components in a commercial HVAC system
3. Define psychrometrics and its importance in the HVAC industry
4. Measure and determine values on a psychrometric chart
5. Measure common pressures in an HVAC system
6. Measure airflow in HVAC systems using various instruments

Course Content

1. Describe the purpose of commercial HVAC systems
 - a. Describe the purpose and function of heating, cooling, ventilation and exhaust systems (Lec)
2. Identify the components in a commercial HVAC system
 - a. Identify the various components in commercial HVAC systems (Lec)

- b. Describe the usage and purpose of components in commercial HVAC systems (Lec)
 - c. Describe the importance of ventilation rates (Lec)
 - d. Determine the ventilation rates of various types of buildings (Lec)
3. Define psychrometrics and its importance in the HVAC industry
 - a. Describe the weight and volume of standard air (Lec and Lab)
 - b. Define wet bulb, dry bulb, relative humidity and dew point (Lec and Lab)
 4. Measure and determine values on a psychrometric chart
 - a. Determine dry bulb, wet bulb, relative humidity, dew point, enthalpy and grains of moisture using a psychrometric chart (Lec and Lab)
 - b. Measure dry bulb and wet bulb temperatures using a psychrometer (Lec and Lab)
 - c. Determine relative humidity using a psychrometer and hygrometer
 5. Measure common pressures in an HVAC system (Lec and Lab)
 - a. Describe the usage and application of a manometer, digital micro manometer and magnetically linked gauge (Lec and Lab)
 - b. Identify a pitot tube, static probe, airfoil probe, velocity probe and velocity grid (Lec and Lab)
 - c. Describe the use of a pitot tube, static probe, airfoil probe, velocity probe and vel-grid (Lec and Lab)
 - d. Properly calculate average velocity using a pitot tube and manometer (Lec and Lab)
 6. Measure airflow in HVAC systems using various instruments
 - a. Properly perform a pitot tube rectangular duct traverse (Lec and Lab)
 - b. Properly perform a pitot tube round duct traverse (Lec and Lab)
 - c. Properly measure airflows using a total capture flow hood (Lec and Lab)
 - d. Define and calculate an Ak factor (Lec and Lab)
 - e. Determine airflow using a rotating vane anemometer and thermal anemometer (Lec and Lab)

Lab Content

1. Properly perform a pitot tube rectangular duct traverse
2. Properly measure airflows using a total capture flow hood
3. Determine airflow using a rotating vane anemometer and thermal anemometer

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
- 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. Testing, Adjusting & Balancing of Environmental 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, chapter on airflow measurements
2. Sample writing assignment: Determine dry bulb, wet bulb, relative humidity, dew point, enthalpy and grains of moisture using a psychrometric chart

Discipline(s)

Sheet Metal