

# APSM 159A: INTRODUCTION TO TESTING ADJUSTING & BALANCING HVAC SYSTEMS

## Foothill College Course Outline of Record

Heading	Value
<b>Effective Term:</b>	Summer 2022
<b>Units:</b>	2.5
<b>Hours:</b>	30 lecture, 10 laboratory per quarter (40 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Apprenticeship Program.
<b>Degree &amp; Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

## Student Learning Outcomes

- A successful student will be able to describe common air flow measurements.
- A successful student will be able to calculate airflow volume, velocity, velocity pressure or area when other factors are provided.

## Description

Students will gain an overview of the fundamental process of heat transfer and how pressures relate to air movement in HVAC systems.

## Course Objectives

The student will be able to:

1. Describe the flow of heat in objects
2. Describe common airflow measurements
3. Describe the pressures measured in airflow
4. Identify airflow formulas
5. Calculate airflow volume, velocity, velocity pressure and area
6. Describe standard air and correction tables for non-standard air
7. Describe temperature scales
8. Describe heat and heat transfer terminology

## Course Content

1. Describe the flow of heat in objects (Lec and Lab)
2. Describe common airflow measurements
  - a. Describe CFM, FPM and area used in air balance formulas (Lec and Lab)
3. Describe the pressures measured in airflow
  - a. Describe total, static and velocity pressure (Lec and Lab)
  - b. Perform airflow calculations for volume, flow rate and pressure (Lec and Lab)

4. Identify airflow formulas
  - a. Discuss air density and properties of moist air (Lec and Lab)
5. Calculate airflow volume, velocity, velocity pressure and area
  - a. Calculate correct flow rates for non-standard air (Lec and Lab)
6. Describe standard air and correction tables for non-standard air
  - a. Define value for standard air (Lec and Lab)
  - b. Describe weight and volume of standard air (Lec and Lab)
  - c. Calculate corrections to standard air for temperature and elevation (Lec and Lab)
7. Describe temperature scales
  - a. Define Fahrenheit, Celsius, Kelvin and Rankine temperature scales (Lec and Lab)
  - b. Convert temperatures from different scales (Lec and Lab)
8. Describe heat and heat transfer terminology
  - a. Define the terms BTU, BTUH, MBH and  $[\Delta]T$  (Lec and Lab)
  - b. Define and perform calculations using heat transfer formulas (Lec and Lab)
  - c. Explain total, sensible and latent heat (Lec and Lab)
  - d. Calculate percentage of outside air (Lec and Lab)
  - e. Describe functions of coils in heat transfer (Lec and Lab)

## Lab Content

1. Observe lab demonstrations of airflow characteristics and heat transfer
2. Demonstrate proper set up of an air data meter and pitot tube

## Special Facilities and/or Equipment

1. Laboratory with sheet metal service tools
2. Sheet metal test and balance tools and sample system components
3. Personal protective equipment
4. 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:

Demonstrated mastery of course topics as measured by the results of written quizzes, tests, and lab practical  
 Class participation  
 Comprehensive written final examination  
 Comprehensive final project

## 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, Unit 4, "Airflow"
2. Sample writing assignment: Write formulas for the following airflow variables: CFM, total pressure, static pressure, velocity pressure

## **Discipline(s)**

Sheet Metal or Air Conditioning, Refrigeration, Heating