

# APSM 171B: BASICS OF AIRFLOW, HEAT ENERGY & HEAT TRANSFER

## 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 CFM, FPM and Area used in air balance formulas.
- A successful student will be able to describe standard air and correction tables for non-standard air.

## Description

Students obtain 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:

- Describe the flow of heat in objects
- Describe cubic feet per minute (CFM)
- Describe the pressures measured in airflow
- Identify airflow formulas
- Calculate airflow volume, velocity, velocity pressure and area
- Describe standard air and correction tables for non-standard air
- Describe temperature scales
- Describe heat and heat transfer terminology

## Course Content

- Describe the flow of heat in objects
  - Describe how heat flows in objects (Lec and Lab)
- Describe cubic feet per minute (CFM)
  - Describe CFM, FPM and area used in air balance formulas (Lec and Lab)
- Describe the pressures measured in airflow

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

## Lab Content

- Measure total, static, and velocity pressure
- Measure total, sensible and latent heat

## Special Facilities and/or Equipment

- Laboratory with sheet metal test and balance tools and sample system components
- Personal protective equipment
- 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  
 Evaluation of progress by periodic assignments  
 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: Assigned text section on heat flow in objects
2. Sample writing assignment: Perform airflow calculations for volume, flow rate and pressure

## **Discipline(s)**

Sheet Metal