

# APSM 173C: HVAC FANS, FAN LAWS & V-BELT DRIVES

## 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 the characteristics found on a fan curve or performance chart.
- A successful student will be able to calculate new fan operating values using fan law formulas.

## Description

Students will survey common types of fans used in HVAC systems and learn the factors that affect fan performance and fan drive packages.

## Course Objectives

The student will be able to:

1. Describe how a fan causes air movement
2. Describe the two main styles of fans generally used in HVAC
3. Identify common centrifugal fans
4. Identify common axial fans
5. Describe the characteristics found on a fan curve or performance chart
6. Describe the AMCA fan classifications
7. Describe how system effect relates to fan performance
8. Define the components in a V-belt drive package
9. Calculate new fan operating values using fan law formulas

## Course Content

1. Describe how a fan causes air movement
  - a. Describe the pressures that cause air movement across a fan (Lec)
2. Describe the two main styles of fans generally used in HVAC
  - a. Describe the characteristics of centrifugal fans (Lec)
  - b. Describe the characteristics of axial fans (Lec)
3. Identify common centrifugal fans

- a. Identify radial-blade fans (Lec)
  - b. Identify forward curved blade fans (Lec)
  - c. Identify backward inclined blade fans (Lec)
4. Identify common axial fans
    - a. Identify propeller fans (Lec)
    - b. Identify vaneaxial and tubeaxial fans (Lec)
  5. Describe the characteristics found on a fan curve or performance chart
    - a. Describe the fan characteristics found on a fan curve or performance chart (Lec and Lab)
    - b. Determine operating values using a fan curve or performance table (Lec and Lab)
  6. Describe the AMCA fan classifications
    - a. Describe the characteristics of AMCA fan classes (Lec and Lab)
  7. Describe how system effect relates to fan performance
    - a. Describe duct system effect (Lec and Lab)
    - b. Describe the effects on fan performance due to system effect (Lec and Lab)
  8. Define the components in a V-belt drive package
    - a. Identify V-belt, motor sheave and fan sheave (Lec and Lab)
    - b. Calculate belt length and describe pitch diameter (Lec and Lab)
  9. Calculate new fan operating values using fan law formulas
    - a. Calculate new CFM, RPM, diameter, static pressure and BHP using fan laws (Lec and Lab)
    - b. Calculate new motor and fan sheave (Lec and Lab)

## Lab Content

1. Observe demonstrations of fan types and characteristics

## 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

## 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 on fans and fan laws
2. Sample writing assignments:
  - a. Describe the effects on fan performance due to system effect
  - b. Calculate a new motor and fan sheave

## **Discipline(s)**

Sheet Metal