

# APSM 179B: SOUND & VIBRATION IN HVAC SYSTEMS

## Foothill College Course Outline of Record

| Heading                            | Value  |
|------------------------------------|--|
| <b>Effective Term:</b>             | Summer 2022  |
| <b>Units:</b>                      | 2.5  |
| <b>Hours:</b>                      | 32 lecture, 8 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 determine sound levels using a sound meter.
- A successful student will be able to discuss the role and duties of the Sound and Vibration Technician.

## Description

Upon completion, students will measure room sound pressure readings to properly complete noise criterion (NC) and room criterion (RC) reports to industry standards. Students will properly conduct vibration testing on various HVAC equipment and document results to industry standards.

## Course Objectives

The student will be able to:

1. Discuss the role and duties of the sound and vibration technician
2. Define amplitude, frequency, pure tone, octave band and decibel
3. Define and discuss the importance of background noise
4. Describe the physiological effects of sound
5. Determine sound levels using a sound meter
6. Describe and develop a noise criterion (NC) curve
7. Describe and develop a room criterion (RC) curve
8. Define a "free field" and a "diffuse field"
9. Define a "sound absorption coefficient" (SAC) and a "sabin"
10. Identify noise and vibration transmission paths in a building
11. Discuss types of equipment vibration isolators
12. Perform a room NC and RC test
13. Perform a vibration test on a utility fan

## Course Content

1. Discuss the role and duties of the sound and vibration technician (Lec)
2. Define amplitude, frequency, pure tone, octave band and decibel

- a. Define amplitude and frequency (Lec)
- b. Define pure tone, octave band and decibel (Lec)
3. Define and discuss the importance of background noise
  - a. Define background noise (Lec)
  - b. Calculate the correction for background noise for sample readings (Lec and Lab)
4. Describe the physiological effects of sound
  - a. Discuss the physiological effects of sound and allowable exposure limits (Lec and Lab)
5. Determine sound levels using a sound meter
  - a. Perform a dbA and dbC reading using a type II sound meter (Lec and Lab)
  - b. Perform octave band frequency readings using a type II sound meter (Lec and Lab)
6. Describe and develop a noise criterion (NC) curve
  - a. Identify the characteristics of an NC curve and plot sample readings (Lec and Lab)
7. Describe and develop a room criterion (RC) curve
  - a. Identify the characteristics of an RC curve and plot sample readings (Lec and Lab)
8. Define a "free field" and a "diffuse field" (Lec and Lab)
9. Define a "sound absorption coefficient" (SAC) and a "sabin" (Lec and Lab)
10. Identify noise and vibration transmission paths in a building
  - a. Discuss possible paths of transmission for sound and vibrations in a building (Lec and Lab)
  - b. Discuss methods of reducing sound and vibration transmissions in a building (Lec and Lab)
11. Discuss types of equipment vibration isolators
  - a. Discuss the types and use of equipment vibration isolators (Lec and Lab)
12. Perform a room NC and RC test
  - a. Perform and document a NC report (Lec and Lab)
  - b. Perform and document a RC report (Lec and Lab)
13. Perform a vibration test on a utility fan
  - a. Perform a three axis vibration test on a utility fan (Lec and Lab)

## Lab Content

1. Perform a dbA and dbC reading using a type II sound meter
2. Perform octave band frequency readings using a type II sound meter

## 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 for the Sheet Metal and Air Conditioning Industry. Sound and Vibration Technology. 2001.

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, pages regarding the roles and duties of the sound and vibration technician
2. Sample writing assignments:
  - a. Define background noise
  - b. Discuss methods of reducing sound and vibration transmissions in a building

## **Discipline(s)**

Sheet Metal