

# APSM 156B: COOLING TOWERS, PUMPS & PIPING

## Foothill College Course Outline of Record

Heading	Value
<b>Effective Term:</b>	Summer 2022
<b>Units:</b>	2.5
<b>Hours:</b>	35 lecture, 5 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 demonstrate basic start up, maintenance and diagnosis procedures on cooling towers and pumps.
- A successful student will be able to explain the function of a cooling tower.

## Description

Students develop an understanding of cooling towers, pumps, and condensing water circulation system requirements, using theory and system materials.

## Course Objectives

The student will be able to:

1. Explain the purpose and operation of cooling towers and pumps
2. Explain the types and function of cooling towers and related piping
3. Perform start-up, diagnosis, repair, and maintenance of cooling towers and pumps

## Course Content

1. Explain the purpose and operation of cooling towers and pumps
  - a. Describe the purpose of cooling water towers used with chilled water systems (Lec and Lab)
  - b. State the relationship of the cooling capacity of the water tower and the wet bulb temperature of the outside air (Lec and Lab)
  - c. State the means by which the cooling tower reduces water temperature (Lec and Lab)
  - d. Describe three types of cooling water towers (Lec and Lab)
2. Explain the types and function of cooling towers and related piping
  - a. Explain the various uses of fill material in cooling water towers (Lec and Lab)
  - b. List the two types of fan drives (Lec and Lab)

- c. State the two types of fans used in water cooling towers (Lec and Lab)
  - d. Explain the purpose of the water tower sump (Lec and Lab)
  - e. Explain the purpose of make-up water (Lec and Lab)
  - f. Describe a centrifugal pump (Lec and Lab)
3. Perform start-up, diagnosis, repair, and maintenance of cooling towers and pumps
    - a. Describe water vortexing (Lec and Lab)
    - b. Explain two types of motor pump alignment (Lec and Lab)
    - c. Perform start-up of a cooling tower (Lec and Lab)

## Lab Content

1. Perform start-up on a cooling tower in the lab

## Special Facilities and/or Equipment

1. Laboratory with sheet metal service tools
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

Whitman, B., B. Johnson, J. Tomczyk, and E. Silberstein. Refrigeration and Air Conditioning Technology, 8th ed. 2016.

Auvil, Ronnie J.. HVAC Controls Systems, 4th ed. 2017.

These are the standard sheet metal textbooks/workbooks used for this course. Although one or more may not be within five years of the required published date, they are the most current books used when teaching this course.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Sample reading assignment: From the Refrigeration and Air Conditioning Technology textbook, Unit 48, "Cooling Towers and Pumps"

2. Sample writing assignment: Answer review questions related to assigned reading

## **Discipline(s)**

Sheet Metal or Air Conditioning, Refrigeration, Heating