

APSM 156A: HEAT PUMP EFFICIENT OPERATION & SERVICE

Foothill College Course Outline of Record

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

Student Learning Outcomes

- A successful student will be able to explain the function and operation of components specific to heat pumps.
- A successful student will be able to explain the defrost cycle and they ways it is accomplished in heat pump systems.

Description

Students learn how heat pumps function to transfer heat in either direction and apply theory with actual components.

Course Objectives

The student will be able to:

1. Understand the theory of heat pump systems
2. Understand the different components of heat pumps (e.g., air source, water source, geothermal, etc.)
3. Perform start-up, diagnosis, repair and maintenance of air and water source heat pumps

Course Content

1. Understand the theory of heat pump systems
 - a. Describe year-round air conditioning (heat pump) systems (Lec and Lab)
 - b. Explain the five ways to condition air (Lec and Lab)
2. Understand the different components of heat pumps (e.g., air source, water source, geothermal, etc.)
 - a. Discuss the three typical year-round (heat pump) air conditioning systems (Lec and Lab)
 - b. Explain the function and operation of components specific to heat pumps (Lec and Lab)
 - c. Explain the defrost cycle and they ways it is accomplished in heat pump systems (Lec and Lab)

3. Perform start-up, diagnosis, repair and maintenance of air and water source heat pumps
 - a. Perform a start up/diagnostic of a heat pump (Lec and Lab)
 - b. Discuss preventative maintenance supplement (Lec and Lab)
 - c. Discuss service call supplements (Lec and Lab)

Lab Content

1. Perform start-up and diagnostic procedures on assigned air and water source heat pumps 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, Units 43 and 44
2. Sample writing assignment: Answer review questions related to assigned reading

Discipline(s)

Sheet Metal or Air Conditioning, Refrigeration, Heating