

APSM 176B: BASIC REFRIGERATION & BRAZING/SOLDERING

Foothill College Course Outline of Record

Heading	Value
Units:	2.5
Hours:	32 lecture, 8 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 identify the components in a refrigeration system and their purpose in a refrigeration system.
- A successful student will be able to properly connect manifold gauges to a refrigeration system to measure refrigerant pressure.

Description

Students will describe the location and function of components used in HVAC refrigeration systems. Students will demonstrate proper brazing and soldering techniques.

Course Objectives

The student will be able to:

- Define sensible, latent and total heat
- Define evaporation and condensation and identify where it occurs in a refrigeration system
- Define enthalpy, superheat and sub-cool in a refrigeration cycle
- Discuss CFCs and their effect on the environment
- Identify the components in a refrigeration system and their purpose in a refrigeration system
- Define types of metering devices in a refrigeration system
- Describe the control functions in a refrigeration system
- Describe how a heat pump functions
- Describe how a chiller functions
- Properly connect manifold gauges to a refrigeration system to measure refrigerant pressure
- Determine proper refrigerant and charge required for a refrigerant system
- Evacuate and recover refrigerant from a refrigeration system
- Describe the techniques for flaring, soldering, swaging and brazing copper tubing

Course Content

- Define sensible, latent and total heat (Lec)

B. Define evaporation and condensation and identify where it occurs in a refrigeration system

- Define evaporation and condensation (Lec)
- Identify where evaporation and condensation occur in a refrigeration system (Lec and Lab)
- Define enthalpy, superheat and sub-cool in a refrigeration cycle (Lec and Lab)

D. Discuss CFCs and their effect on the environment

- Describe the effects that CFCs have on the Ozone layer (Lec)
- Describe the efforts through legislation to control the impact of CFCs (Lec)

E. Identify the components in a refrigeration system and their purpose in a refrigeration system

- Identify the components in a refrigeration system (Lec)
- Define the function of the components in a refrigeration system (Lec)

F. Define types of metering devices in a refrigeration system

- Identify metering devices in a typical HVAC refrigeration system (Lec)
- Identify the various types of metering devices in refrigeration systems (Lec)

G. Describe the control functions in a refrigeration system

- Describe the control sequence of operation for a refrigeration system (Lec)
- Describe short cycling and hot gas bypass controls in a refrigeration system (Lec)

H. Describe how a heat pump functions

- Identify the reversing valve in a heat pump system (Lab)
- Describe the operation of a heat pump in cooling and heating modes (Lec)

I. Describe how a chiller functions

- Describe the function and operation of a chiller in a refrigeration system (Lec)
- Properly connect manifold gauges to a refrigeration system to measure refrigerant pressure

J. Properly connect manifold gauges to a refrigeration system to measure refrigerant pressure

- Identify service valves and manifold gauges used in servicing refrigeration systems (Lab)
- Properly connect a manifold gauge set to a refrigeration system (Lab)

K. Determine proper refrigerant and charge required for a refrigerant system

- Determine the refrigerant in a system and its required charge pressures (Lec)
- Evacuate and recover refrigerant from a refrigeration system (Lab)

L. Evacuate and recover refrigerant from a refrigeration system

- Properly perform a refrigerant evacuation and recovery from an HVAC system (Lab)
- Describe the techniques for flaring, soldering, swaging and brazing copper tubing

M. Describe the techniques for flaring, soldering, swaging and brazing copper tubing

- Perform flaring, swaging, soldering and brazing of copper tubing to industry standards (Lab)

Lab Content

- Properly connect a manifold gauge set to a refrigeration system
- Properly perform a refrigerant evacuation and recovery from an HVAC system

Special Facilities and/or Equipment

- Laboratory with sheet metal test and balance tools and sample system components
- Personal protective equipment

Method(s) of Evaluation

- Results of written quizzes and tests

- B. Responses in class discussions
- C. Comprehensive written final examination
- D. Comprehensive final project
- E. Demonstration of assigned skills to acceptable level per instructor

Method(s) of Instruction

- A. Lecture
- B. Discussion
- C. Demonstration
- D. Lab assignments followed by discussion

Representative Text(s) and Other Materials

International Training Institute for the Sheet Metal and Air Conditioning Industry. HVAC. Alexandria, VA: International Training Institute, 2005.

NOTE: This is the standard Sheet Metal textbook/workbook used for this course. Although it may not be within 5 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

- A. Sample reading assignment: From the textbook, assigned sections on the refrigeration cycle and the components of a refrigeration system.
- B. Sample writing assignment: Describe the control sequence of operation for a refrigeration system.
- C. Complete EPA 608 Refrigeration Handling certification written testing.

Discipline(s)

Sheet Metal