

APSM 156C: CHILLED WATER HVAC SYSTEMS & COMPONENTS

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	2.5
Hours:	35 lecture, 5 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 functions of common chiller controls.
- A successful student will be able to identify the purpose and operation of chillers.

Description

Students receive an introduction to the operation, maintenance and repair of chilled water systems.

Course Objectives

The student will be able to:

1. Explain the purpose and some applications of chillers
2. Identify the types of chillers
3. Explain the functions of chiller controls for energy efficient operation
4. Perform start-up, diagnosis, repair, and maintenance of chillers and chilled water fan coils

Course Content

1. Explain the purpose and some applications of chillers
 - a. Explain the purpose and some applications of chillers (Lec)
 - b. Identify and explain difference between industrial and commercial chillers (Lec)
2. Identify the types of chillers
 - a. Identify the types of chilled water systems (Lec and Lab)
 - b. Explain the difference between direct expansion and flooded chiller evaporators (Lec and Lab)
 - c. State the type of compressor used in low pressure chiller systems (Lec and Lab)
 - d. Describe the operation of a centrifugal compressor in a high pressure chiller (Lec and Lab)

- e. Explain the purge system used on a low pressure chiller condenser (Lec and Lab)
 - f. Describe the absorption cooling system process (Lec and Lab)
 - g. State the cooling medium generally used on large absorption chillers (Lec and Lab)
3. Explain the functions of chiller controls for energy efficient operation
 - a. Explain the operations of components and the functions of chiller controls (Lec and Lab)
 - b. State the types of compressors used with high pressure chillers (Lec and Lab)
 - c. State two types of condensers used in chilled water systems (Lec and Lab)
 - d. List the types of metering devices used in high pressure chillers (Lec and Lab)
 - e. Describe the metering devices used in a low pressure chiller system (Lec and Lab)
 4. Perform start-up, diagnosis, repair, and maintenance of chillers and chilled water fan coils
 - a. Perform start-up, diagnosis, repair, and maintenance of chillers (Lec and Lab)
 - b. Prepare a chiller for commissioning (Lec and Lab)
 - c. Identify components and describe their functions (Lec and Lab)
 - d. Identify sequence of operation of a typical chiller (Lec and Lab)
 - e. Troubleshoot all system components (Lec and Lab)
 - f. Calculate system efficiency (Lec and Lab)
 - g. Record and analyze operating temperatures and pressures (Lec and Lab)
 - h. Navigate chiller controller menus (Lec and Lab)

Lab Content

1. Perform diagnosis and maintenance on assigned chillers and/or chilled water fan coils

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 49, "Operation, Maintenance, and Troubleshooting of Chilled Water Air Conditioning Systems"
2. Sample writing assignment: Answer review questions related to assigned reading

Discipline(s)

Sheet Metal or Air Conditioning, Refrigeration, Heating