



Western Technical College

10601140 HVACR Commercial Systems

Course Outcome Summary

Course Information

Description	This course studies the design, application, operation, and maintenance of large commercial air conditioning, refrigeration, and air handling systems. Coursework includes lab studies as well as field study trips to commercial installations. HVACR is a common reference to Heating, Ventilation, Air Conditioning and Refrigeration.
Career Cluster	Architecture and Construction
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	72

Pre/Corequisites

Prerequisite 10601101 HVACR Refrigeration

Textbooks

Refrigeration and Air Conditioning Technology. 9th Edition. Copyright 2021. Whitman, Bill, Bill Johnson, John Timczyk, and Eugene Silberstein. Publisher: Cengage Learning. **ISBN-13:978-0-357-12227-3**. Required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Program Outcomes

1. Evaluate HVACR system designs
2. Analyze HVACR systems

Course Competencies

1. Evaluate air handling systems

Criteria

You will know you are successful when

- 1.1. diagrams of air handling systems are complete with 80% accuracy

Learning Objectives

- 1.a. Diagram a single-zone air handling system
- 1.b. Diagram a multi-zone air handling system
- 1.c. Diagram a reheat air handling system
- 1.d. Diagram a dual-duct air handling system
- 1.e. Diagram an induction air handling system
- 1.f. Diagram a VAV air handling system
- 1.g. List the typical applications for single-zone air handling systems
- 1.h. List the typical applications for multi-zone air handling systems
- 1.i. List the typical applications for reheat air handling systems
- 1.j. List the typical applications for dual-duct air handling systems
- 1.k. List the typical applications for induction air handling systems
- 1.l. List the typical applications for VAV air handling systems
- 1.m. Analyze the use of displacement ventilation systems

2. Summarize the process of how heat is transferred from a zone to the outdoors

Criteria

You will know you are successful when

- 2.1. sketch is complete with 80% accuracy

Learning Objectives

- 2.a. Sketch an all water cooling system
- 2.b. Compose a paragraph describing how heat is moved from an occupied zone to the outdoors

3. Summarize the operation of centrifugal chillers

Criteria

You will know you are successful when

- 3.1. you disassemble and reassemble the compressor in the proper sequence
- 3.2. sketch is complete with 80% accuracy
- 3.3. you follow the start-up checklist

Learning Objectives

- 3.a. Describe the operating principle of centrifugal chillers
- 3.b. Disassemble a gear-drive centrifugal compressor
- 3.c. Diagram a three-stage centrifugal chiller
- 3.d. Start a ten-ton chiller

4. Summarize the operation of rotary screw chillers

Learning Objectives

- 4.a. Describe the operating principle of rotary screw chillers
- 4.b. Describe the three oil circuits used in rotary screw chillers

5. Summarize the operation of absorption chillers

Criteria

You will know you are successful when

- 5.1. tasksheet is complete with 80% accuracy

Learning Objectives

- 5.a. Identify the major components of an absorber
- 5.b. Discuss the operating principles of absorbers

6. Summarize the operation of cooling towers

Criteria

You will know you are successful when

- 6.1. tasksheet is complete with 80% accuracy

Learning Objectives

- 6.a. Describe the operating principle of cooling towers
- 6.b. Calculate the range of a cooling tower
- 6.c. Calculate the approach of a cooling tower
- 6.d. Discuss the need for proper water treatment
- 6.e. Point out three areas where water is lost

7. Value the benefits of thermal storage

Learning Objectives

- 7.a. Summarize a typical electric tariff sheet
- 7.b. Differentiate between demand charges and electrical charges
- 7.c. Describe when on-peak hours occur
- 7.d. Differentiate between ice storage and chilled-water storage
- 7.e. Explain how to shift a building's electrical load by using thermal storage
- 7.f. Discuss typical applications of thermal storage

8. Value the benefits of energy recovery

Learning Objectives

- 8.a. Research a method of energy recovery
- 8.b. Give an oral presentation on a selected energy recovery topic

9. Evaluate the features of ammonia refrigeration

Learning Objectives

- 9.a. Discuss advantages and disadvantages of ammonia refrigeration
- 9.b. Give typical applications of ammonia refrigeration

10. Summarize topics related to building construction and construction documentation

Criteria

You will know you are successful when

- 10.1. presentation meets guidelines of presentation grading rubric

Learning Objectives

- 10.a. Review a topic related to building construction
- 10.b. Summarize the information gathered

11. Interpret construction documents

Criteria

You will know you are successful when

- 11.1. tasksheets are complete with 80% accuracy

Learning Objectives

- 11.a. Explain what construction documents are
- 11.b. Identify the major categories of construction documents
- 11.c. Outline information from each major category that affects the HVAC designer

12. Evaluate construction documents

Criteria

You will know you are successful when

- 12.1. tasksheets are complete with 80% accuracy

Learning Objectives

- 12.a. Locate specific items of information
- 12.b. Determine building construction
- 12.c. Determine HVAC system configuration
- 12.d. Compare design strategies

13. Develop coordination items

Learning Objectives

- 13.a. List the various trades involved in a project
- 13.b. Discuss why coordination between the various trades is necessary
- 13.c. Identify typical coordination items for each major trade
- 13.d. Develop coordination documents