



Course Outline

2026-2027 Catalog

HVAC 21 - Introduction to the Refrigerant System

Catalog Description

Transfer Status: CSU

Prerequisite: ITEC 55, HVAC 11, HVAC 12, HVAC 13

Corequisite: HVAC 22, HVAC 23

Unit(s): 4.00

Lecture: 34.00 Contact hours/68.00 Out of class hours/102.00 Total hours/2.00 Unit(s)

Lab: 102.00 Contact hours/0.00 Out of class hours/102.00 Total hours/2.00 Unit(s)

Total: 136.00 Contact hours/68.00 Out of class hours/204.00 Total hours/4.00 Unit(s)

Course Description: This course is designed to provide pre-employment training in Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) systems for industrial trades. Emphasis will be placed on developing safety skills, metering and gauge identification, lubrication oils used, replacement of refrigerant circuits, knowledge of heat pump systems, and inspection and maintenance of procedures. These areas of instruction will be applied in several hands on performance lab exercises. This course is part of the National Center For Construction Education and Research (NCCER) core curriculum qualification.

Objectives

Upon successful completion of this course, the student should be able to:

1. Practice safety skills that are required on job-sites.
2. Explain the function of refrigerant metering devices and their effect on refrigerants.
3. Describe the equipment and approaches used to leak-test refrigerant circuits.
4. Identify and describe lubricating oils and issues related to their function.
5. Describe the procedures for changing refrigerant circuits.
6. Describe the operation of heat pump systems.
7. Describe the inspection and/or maintenance procedures for selected equipment.

Course Content

Topic Titles / Suggested Time Topic

Lecture

<u>Topics</u>	<u>Lec Hrs</u>
Introduction and Safety	1.50
Review of Refrigerant Cycle Theory	5.00
Tools, Electrical Meters, Pressure Gauges, Temp & Airflow meter	7.50
Refrigerants Blends & Oils	2.50
Testing, Leak Detection, Recovery, Repair, cleanup, & Charging	6.50
Heat Pumps	6.50
Purpose and Procedures for Inspection and Maintenance	4.50
Total Hours:	34.00

Lab

<u>Topics</u>	<u>Lab Hrs</u>
Introduction and Safety	2.00
Review of Refrigerant Cycle Theory	15.00
Tools, Electrical Meters, Pressure Gauges, Temp & Airflow Meter	20.00
Refrigerants Blends & Oils	8.00
Testing, Leak Detection, Recovery, Repair, Cleanup, & Charging	18.00
Heat Pumps	20.50
Purpose and Procedures for Inspection and Maintenance	18.50
Total Hours:	102.00

Methods of Instruction

- A. Demonstrations
- B. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- C. Laboratory Experiments

- D. Lecture
- E. Multimedia Presentations

Methods of Evaluation

- A. Exams/Tests
- B. Quizzes
- C. Homework
- D. Lab Projects

Examples of Assignments

Reading Assignments

- 1. Read module 5 and be prepared to discuss in class.
- 2. Read assigned trade journal article and be prepared to discuss in class. Read the module introducing heat pumps and be prepared to discuss in class.

Writing Assignments

- 1. Write an order of operations for inspection and maintenance of a heat pump.
- 2. Write a two-page essay, explaining how the trade journal article can be implemented in workplace safety and how it relates to the class.

Out-of-Class Assignments

- 1. Research online the proper process for completing “The Loop” process using manufactures publications and be prepared to discuss in class.
- 2. Research OSHA publications for the use and safety of power tools properly and write a one-page essay

Recommended Materials of Instruction

National Center for Construction Education and Research (NCCER). (2018). Heating, Ventilating, and Air Conditioning - Level 2. *Pearson Education INC.*

Other Learning Materials

All tools listed in the HVACR Program Guide.

Minimum Qualifications

Air Cond,Refrig,Heating
Industrial Technology

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