

## COURSE SYLLABUS

<b>LAST REVIEW</b>	Fall 2022
<b>COURSE TITLE</b>	Refrigeration II
<b>COURSE NUMBER</b>	HVAC 0229
<b>DIVISION</b>	Career and Technical Education
<b>DEPARTMENT</b>	HVAC
<b>CIP CODE</b>	47.0201
<b>CREDIT HOURS</b>	3
<b>CONTACT HOURS/WEEK</b>	Class: 1                      Lab: 4
<b>PREREQUISITES</b>	HVAC 0100

### COURSE DESCRIPTION

This course will introduce students to domestic and commercial refrigeration. The course will discuss compressors, condensers, and metering devices. Wiring and controls, defrost cycle, sweat prevention heaters, fan motors, and ice makers will also be covered.

### PROGRAM ALIGNMENT

This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:

[https://kansasregents.org/workforce\\_development/program-alignment](https://kansasregents.org/workforce_development/program-alignment)

### PROGRAM LEARNING OUTCOMES

1. The student will be able to demonstrate the ability to perform HVAC procedures in a safe manner
2. The student will be able to classify the different needs of equipment and summarize a solution.
3. The student will be able to exhibit a high level of professionalism including appropriate dress, attendance, communication skills and other soft skills necessary.

### TEXTBOOKS

<http://kckccbookstore.com/>

### METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning,

labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

## **COURSE OUTLINE**

- I. Special Refrigeration Application
  - A. Transport Refrigeration
  - B. Truck Refrigeration Systems
  - C. Railway Refrigeration
  - D. Cascade Systems
- II. Troubleshooting and Typical Operating Conditions for Commercial Refrigeration.
  - A. Organized Troubleshooting
  - B. Calculating the Correct Head Pressure for Air Cooled Equipment
  - C. Six Typical Problems
    1. Low Refrigerant Charge
    2. Excess refrigerant charge
    3. Inefficient evaporator
    4. Inefficient condenser
    5. Inefficient compressor

## **COURSE LEARNING OUTCOMES AND COMPETENCIES**

Upon successful completion of this course, the student will:

- A. Demonstrate an understanding of basic refrigerated air dry unit operation.
  1. Explain that refrigerated air dryers are basically refrigeration systems located in the air supply, after the storage tank. The air may be cooled in a heat exchanger, then moved to the storage tank where much of the water will separate from the air.
- B. Demonstrate an understanding of the methods used in refrigerating trucks.
  2. Explain that transport refrigeration is the process of refrigerating products while they are being transported from one place to another. This can be by truck, rail, air, or water.
- C. Explain the types of truck refrigeration are:
  3. Explain dry ice
  4. Describe ice
  5. Explain liquid nitrogen
  6. Explain carbon dioxide (CO<sub>2</sub>)
- D. Demonstrate an understanding of cascade refrigeration.
  7. Explain a systems with operating temperatures down to about -160 degrees F using the compression cycle may use a system called cascade refrigeration.

8. Explain the cascade refrigeration uses two or three stages of refrigeration, depending on how low the lower temperature range may need to be.
  9. Explain that this is accomplished when the condenser of one stage exchanges heat with the evaporator in another stage. The condenser rejects heat from the system and the evaporator absorbs heat into the system.
- E. Diagnose an inefficient evaporator.
10. Demonstrate an inefficient evaporator does not absorb the heat into the system and will have a low suction pressure.
- F. Explain the causes of an inefficient evaporator:
11. Demonstrate a dirty coil.
  12. Demonstrate a fan running too slow.
  13. Explain an expansion valve starving the coil
  14. Explain recirculated air.
  15. Demonstrate ice buildup
  16. Demonstrate block air flow.
- G. Diagnose an inefficient condenser.
17. Demonstrate a condenser unable to De-superheat the hot gas from the compressor.
  18. Demonstrate a condenser unable to condense the refrigerant
  19. Demonstrate a condenser unable to sub-cool the refrigerant before it leaves the coil.
- H. Diagnose an inefficient compressor.
20. Demonstrate a compressor pumping at less than capacity.
  21. Demonstrate a compressor unable to pump vapor refrigerant.
  22. Demonstrate a compressor valves: bent, crack, or warped.
  23. Demonstrate a compressor overheats.

### **ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES**

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

### **COLLEGE POLICIES AND PROCEDURES**

*Student Handbook*

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

*College Catalog*

<https://www.kckcc.edu/academics/catalog/index.html>

*College Policies and Statements*

<https://www.kckcc.edu/about/policies-statements/index.html>

*Accessibility and Accommodations*

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.