

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	System Servicing and Troubleshooting
COURSE NUMBER	HVAC 0204
DIVISION	Career and Technical Education
DEPARTMENT	HVAC
CIP CODE	47.0201
CREDIT HOURS	2
CONTACT HOURS/WEEK	Class: 0.5 Lab: 3
PREREQUISITES	HVAC 0100

COURSE DESCRIPTION

This course will cover the fundamentals of system servicing and troubleshooting. This will include air conditioning, all weather systems, centrifugal fan, complex circuits, controls, electric motors, four-way valves, gas furnaces, humidifiers, ice makers, output voltage transformers, pilot safety switches, refrigeration systems, and thermocouples.

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

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. Troubleshooting
 - A. Air Conditioning
 - 1. Mechanical Troubleshooting
 - 2. Gas Manifold Usage
 - 3. When to Connect the Gages
 - 4. Low Side Gage Readings
 - 5. High Side Gage Readings
 - 6. Temperature Readings
 - a. Inlet air temperatures
 - b. Evaporator outlet temperatures
 - 7. Suction line temperatures
 - a. Discharge line temperatures
 - b. Liquid line temperatures
- II. Electrical Motors
 - A. Electrical Motor Troubleshooting
 - B. Mechanical Motor Problems
 - C. Troubleshooting Hermetic Motors
- III. Commercial Refrigeration
 - A. Organized Troubleshooting
 - B. Troubleshooting Temperature Applications
- IV. Troubleshooting Gas Heat

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Demonstrate an understanding of the correct instruments for checking an air conditioning unit with a mechanical problem.
 - 1. Demonstrate the proper use of the gage manifold, indicates the low and high pressures.
 - 2. Demonstrate proper use of the Schrader valve and the service valve.
 - 3. Demonstrate proper use of the four-lead electronic thermometer when taken temperature readings.
 - 4. Demonstrate using a volt-ohm-meter.
 - 5. Demonstrate using a clamp-on ammeter for checking amps draws.
 - 6. Demonstrate the use of mega-ohm meter for checking motor windings.
 - 7. Explain the purpose of refrigerant oil for motor lubrication.
- B. Demonstrate the ability to select the correct instruments to troubleshoot electrical problems in an air conditioning system.
 - 8. Demonstrate the volt-ohm-meter.

9. Demonstrate the mega ohm meter can be used to verify if the windings in the compressor are good.
 10. Demonstrate the volt-alert meter can be used to detect if voltages are present in the system.
 11. Demonstrate the clamp-on ammeter for checking amp-draw on a motor.
 12. Demonstrate the use of an infra-red thermometer for excessive heat.
 13. Explain knowledge of ohms-law.
 14. Explain knowledge of a data-recorder for recording voltages changes.
- C. Demonstrate the ability to check the line and low voltage power supplies.
15. Demonstrate the volt meter can be used to detect the line voltages of 120 or 240 volts.
 16. Demonstrate the amp-meter can be used to detect the amperage in the line voltages.
 17. Demonstrate safety practices should be follow when working around line voltages.
 18. Demonstrate the volt meter can also be used to detect the low voltage (control voltage).
 19. Explain the knowledge of electrical polarity.
 20. Explain the relationship of voltage and amperage.
 21. Demonstrate the proper use of the volt-meter leads.
- D. demonstrate the ability to diagnose an inefficient compressor.
22. Demonstrate the compressor comes on and turns off repeatedly.
 23. Demonstrate the compressor is excessive hot to the touch
 24. Demonstrate the dome of the compressor is sweating (too much refrigerant)
 25. Demonstrate the compressor has high lock rotor amps. (LRA).
 26. Demonstrate the pressures are equalized between the high and low side of the system.
 27. Explain the state of refrigerant passing through the compressor.
 28. Explain the compressor ratio efficiency.

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>.