SYLLABUS

DATE OF LAST REVIEW: 08/13/14
CIP CODE: 47.0106
SEMESTER: Departmental Syllabus
COURSE TITLE: Advanced Refrigeration
COURSE NUMBER: MAPR0222
CREDIT HOURS: 4
INSTRUCTOR: Departmental Syllabus
OFFICE LOCATION: Departmental Syllabus
OFFICE HOURS: Departmental Syllabus
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KCKCC-issued email accounts are the official means for electronically communicating with our students.

PREREQUISITES: None

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, http://www.kckccbookstore.com/, for the required texts for your particular class.

COURSE DESCRIPTION: This course teaches the students to safely connect gauges for testing and servicing, to use safe, correct and legal procedures to service typical home and commercial refrigerated units, to use proper procedures to correctly analyze refrigeration problems, and to identify and explain the operation of different types of controls such as temperature and deicing. The course will teach the proper methods and procedures of refrigerant recovery, charging, and system vacuuming, tube sizing, system fabrication, wiring schematics, fluid mechanics of both refrigerant and ambient air. Students will chart temperature changes, heat exchange, pressures and fluid states with a pressure enthalpy chart. Students will learn to calculate superheat, sub-cooling, and the theoretical heat of compression.

METHOD 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, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

**COURSE OUTLINE:**

I. Basic refrigerant system
   A. Evaporator
   B. Compressor
   C. Condenser
   D. Metering device

II. Sizing and interconnecting Refrigerant Components
   A. Brazing
      1. Swaging
      2. Pinch points
      3. Bending
      4. Dissimilar Metals
      5. Slip joints
   B. Leak testing
      1. Dry Nitrogen Pressurization
      2. Soap Bubbles
      3. Electronic leak detector
   C. Wiring
      1. Cutting
      2. Splicing
      3. Crimping
      4. Motor Controls
      5. Power Passing Control Devices
      6. Circuit load Devices
      7. Wiring Harness Dressing

III. Enclosure design and Fabrication
    A. Calculate cubic ft.
    B. Select materials
    C. Calculate Heat Load
    D. Determine optimum Air flow

IV. Project Measurements
    A. Temperature
       1. Superheat
       2. Sub-Cooling
       3. Delta temperature
       4. Temperature difference
       5. Cut-in Cut-out differential
    B. Pressure
1. Saturation
2. Vapor
3. Liquid
4. High side
5. Low side

C. Electrical
1. Voltage
2. Amperage
3. Ohms
4. Locked Rotor Amps
5. Rated Load Amps

D. Weight
1. Refrigerant charged
2. Refrigerant recovered

V. Pressure Enthalpy Chart
A. Graphing Project performance
   1. Superheat
   2. Sub-cooling
   3. High and low pressures
   4. Theoretical Heat of Compression
   5. Percentage of vapor to liquid at saturation

VI. Refrigerant Recovery
A. Active
B. Passive
C. Safe practices

EXPECTED LEARNER OUTCOMES:
A. The student should be able to draw the basic refrigerant system, labeling components, piping and wires.
B. The student should be able to construct a functioning refrigeration system on the service bench.
C. The student should be able to install/replace refrigerant metering device and adjust product superheat.
D. The student should be able to measure and calculate system/compressor efficiency.
E. The student should be able to test bench refrigeration project’s brazed joints at 100 psi for leaks.
F. The student should be able to test and evaluate temperatures, pressures and superheat of the operating refrigeration.
G. The student should be able to charge the refrigeration project
H. The student should be able to recover refrigerant from basic refrigeration projects.
COURSE COMPETENCIES:

The student should be able to draw the basic refrigerant system, labeling components, pipes and wires.

1. The student should be able to draw the basic refrigerant system, labeling components, pipes and wires.

The student should be able to construct a functioning refrigeration system on the service bench.

2. The student should be able to braze interconnecting tubing
3. The student should be able to select refrigerant component locations
4. The student should be able to mount and secure refrigerant components
5. The student should be able to construct the project wire harness.

The student should be able to install/replace refrigerant metering device and adjust product superheat.

6. The student should be able to remove valve core
7. The student should be able to score and break capillary tube
8. The student should be able to braze dissimilar metals
9. The student should be able to observe brazing procedures
10. The student should be able to observe safe practices

The student should be able to measure and calculate system/compressor efficiency.

11. The student should be able to measure and calculate system/compressor efficiency

The student should be able to leak test, bench refrigeration project’s brazed joints at 100psi for leaks.

12. The student should be able to observe safe practices pressurizing system with dry nitrogen
13. The student should be able to adjust system pressure to 100psi
14. The student should be able to leak test the project.
15. The student should be able to operate an electronic leak detector
16. The student should be able to use soap bubble leak detection system

The student should be able to test and evaluate temperatures, pressures and superheat of the operating refrigeration.

17. The student should be able to mount electronic thermostat probe
18. The student should be able to properly connect refrigerant gauges
19. The student should be able to interpret saturation temperature
20. The student should be able to interpret saturation pressure
21. The student should be able to calculate superheat
22. The student should be able to calculate sub-cooling
23. The student should be able to calculate delta temperature
24. The student should be able to calculate temperature difference

The student should be able to charge the refrigeration project

25. The student should be able to identify color coded refrigerant vessels
26. The student should be able to vacuum sealed system
27. The student should be able to charge by temperature pressure
28. The student should be able to charge by weight
29. The student should be able to record amount charged in accordance with EPA standards and guidelines.

   *The student should be able to recover refrigerant from basic refrigeration projects.*

30. The student should be able to observe refrigerant recovery safe practices
31. The student should be able to properly operate refrigerant recovery unit
32. The student should be able to identify recovery vessels
33. The student should be able to record amount recovered in accordance with EPA standards and guidelines

**ASSESSMENT OF LEARNER OUTCOMES:** Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

**SPECIAL NOTES:**
This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

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