SYLLABUS

DATE OF LAST REVIEW: 02/2013
CIP CODE: 47.0201
SEMESTER: Departmental Syllabus
COURSE TITLE: Heat Pump Systems
COURSE NUMBER: HVAC0203
CREDIT HOURS: 3
INSTRUCTOR: Departmental Syllabus
OFFICE LOCATION: Departmental Syllabus
OFFICE HOURS: Departmental Syllabus
TELEPHONE: Departmental Syllabus
EMAIL: KCKCC issued email accounts are the official means for electronically communicating with our students.

PREREQUISITES: HVAC0101

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

COURSE DESCRIPTION:
(GREEN TECHNOLOGY) This course will cover the fundamentals of heat pump systems. This will include reverse-cycle refrigeration, four-way valves, ground source heat pumps, water source heat pumps, air source heat pumps, refrigerant line identification, types of metering devices, and liquid-line accessories. Installation and troubleshooting will also be covered.

METHOD OF INSTRUCTION:
A variety of instructional methods may be used depending on content area. They may include but are not limited to lecture, multimedia, cooperative/collaborative learning, demonstrations, labs, on-the-job, internships, and other learning experiences outside the classroom. Methodology will be selected to best meet student needs.
COURSE OUTLINE:
I. Air Source Heat Pump
   A. Reverse Cycle Refrigeration
      1. Heat Pumps
      2. Four way valve
   B. The Four Way Valve
   C. Types of Heat Pumps
      1. Water to air heat pumps
      2. Removing heat from the ground
      3. Air to air heat pump
   D. Metering Devices
   E. Thermostatic Expansion Valves (TXV)
   F. Liquid Line Accessories
   G. Auxiliary Heat
   H. Balance Point
   I. Coefficient of Performance (COP)
   J. Defrost Cycle
      1. Initiating the defrost cycle
      2. Terminating the defrost cycle
      3. Electronic control of defrost
II. Geothermal Heat Pumps
   A. Geothermal Heat Pumps Classifications
   B. Open Loop Systems
   C. Closed Loop Systems
   D. Earth Coupled Systems
   E. Systems Materials and Heat Exchange Fluids

EXPECTED LEARNER OUTCOMES:

A. The student will be able to demonstrate an understanding of a four way valve.
B. The student will be able to list the components of a reverse cycle heat pump.
C. The student will be able to demonstrate an understanding of the various heat sources for heat pumps.
D. The student will be able to demonstrate an understanding of heat pump terminology.
E. The student will be able to demonstrate an understanding of coefficient of performance and auxiliary heat.

COURSE COMPETENCIES:
Upon successful completion of this course:

*The student will be able to demonstrate an understanding of a four way valve.*
1. The student will be able to demonstrate reverse refrigerant flow
2. The student will be able to demonstrate whether the unit is in the heating or cooling mode.
   *The student will be able to list the components of a reverse cycle heat pump.*
3. The student will be able to explain an Indoor Coil
4. The student will be able to explain an Outdoor Coil
5. The student will be able to demonstrate Bi-flow Filter-Drier
6. The student will be able to demonstrate a Four-Way Valve
7. The student will be able to demonstrate Accumulator.
8. The student will be able to demonstrate a Compressor.
9. The student will be able to demonstrate the Defrost Cycle.
10. The student will be able to demonstrate the Outdoor Fan Motor.
11. The student will be able to demonstrate the Indoor Fan Motor.

   *The student will be able to list the sources of heat for various heat pumps.*
12. The student will be able to explain an Air to air heat pump.
13. The student will be able to explain a Water to air heat pump.
14. The student will be able to explain a Ground Source heat pump.
15. The student will be able to explain a Solar heat source.

   *The student will be able to demonstrate an understanding of heat pump terminology.*
16. The student will be able to explain Coefficient of Performance (COP)
17. The student will be able to demonstrate Emergency Heat – Back up source of heat
18. The student will be able to demonstrate Defrost Cycle – Timed or Temperature
19. The student will be able to explain Balance Point – Heat loss is greater than heat supplied.
20. The student will be able to demonstrate Four-Way Valve – Reverses flow of refrigerant in system.
21. The student will be able to explain Energy Savings – Electricity is cheaper than natural gas.

   *The student will be able to demonstrate an understanding of coefficient of performance and auxiliary heat.*
22. The student will be able to explain Coefficient of Performance – When a heat pump is pumping in exactly as much heat as the building is leaking out.
23. The student will be able to explain Coefficient of Performance – for a heat pump is 4 to 1 ratio.
24. The student will be able to demonstrate Auxiliary heat – A back up source of heat for when the heat pump becomes less efficient.
25. The student will be able to demonstrate gas heat back up.
26. The student will be able to demonstrate electric heat back up.
27. The student will be able to explain propane heat back up.

**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.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the Director of the Academic Resource Center at (913) 288-7670 V/TDD.