SYLLABUS

DATE OF LAST REVIEW: 02/2013
CIP CODE: 47.0201
SEMESTER: 1st
COURSE TITLE: Heating (Other) Geothermal (Green Technology)
COURSE NUMBER: HVAC0235
CREDIT HOURS: 1
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.

PREREQUISITE(S): HVAC0101, HVAC0203

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 will cover the Geothermal heat pumps which are refrigeration machines. Geothermal heat pumps use the earth, or water in the earth, for their heat source and heat sink. Energy is transferred daily to and from the earth by the sun’s radiation, rain, and wind. Each year, more than 6000 times the amount of energy currently used by humans is striking the earth from the sun. This is the study of how we can use this energy.

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

COURSE OUTLINE:
I. Geothermal Heat Pump Classifications
A. Closed-loop
B. Open-loop

II. Water Quality

III. Ground Loop Configurations and Flows
A. Parallel-Vertical
B. Single-layer, horizontal
C. Two-layer, horizontal
D. Four-pipe, horizontal
E. Slinky, ground
F. Pond or lake loop

IV. System Materials and Heat Exchange Fluids
V. Geothermal Wells and Water Sources

EXPECTED LEARNER OUTCOMES:

A. The student will be able to describe an open and closed loop geothermal heat pump system.
B. The student will be able to explain how water quality affects an open loop geothermal heat pump.
C. The student will be able to demonstrate the different ground loop configurations for closed loop geothermal heat pump systems.
D. The student will be able to demonstrate the different system fluids and heat exchanger materials

COURSE COMPETENCIES:
Upon successful completion of this course:

The student will be able to describe an open and closed loop geothermal heat pump system.
1. The student will be able to describe how the open loop system uses water from the earth as the heat transfer medium and then expels the water back to the earth.
2. The student will be able to describe how the closed loop system reuses the same heat transfer fluid, which is circulated in buried plastic pipes within the earth or within a lake or pond.

The student will be able to explain how water quality affects an open loop geothermal heat pump.
3. The student will be able to explain will the well deliver enough water in gallons per minute (gpm) to the heat pump.
4. The student will be able to describe what is the temperature of the well water.
5. The student will be able to explain is the well water clean and low in minerals.

The student will be able to describe different ground loop configurations for closed loop geothermal heat pump systems.
6. The student will be able to describe the ground parallel-vertical loop.
7. The student will be able to describe the single-layer, horizontal ground loop.
8. The student will be able to describe the two-layer, horizontal ground loop.
9. The student will be able to describe the four-pipe, horizontal ground loop.
10. The student will be able to describe the slinky ground loop.
11. The student will be able to describe the pond or lake loop.

The student will be able to demonstrate the different system fluids and heat exchanger pipe materials.

12. The student will be able to explain the advantages of polyethylene pipe.
13. The student will be able to explain the advantages of polybutylene pipe.
14. The student will be able to explain the use of salts - Calcium chloride and sodium chloride.
15. The student will be able to explain the use of glycols – Ethylene glycol and propylene glycol.
16. The student will be able to explain the use of alcohols – Methyl, isopropyl, and ethyl.

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.