**This syllabus is intended as a set of guidelines for this course. Eastfield College and your instructor reserves the right to make modification in content, schedule and requirements as necessary to promote the best education possible within prevailing conditions affecting the course.**

**Course Description:**

PREREQUISITES:
HART 1403 AC Control Principles and HART 1407 Principles of Refrigeration
A study of heat pumps, heat pump control circuits, defrost controls, auxiliary heat, air flow, and other topics related to heat pump systems.
(4 hr Lecture, 4 hr Lab., 4 Credit Hr.)

**Textbook:**
Refrigeration and Air Conditioning Technology; 6th Edition,
By Whitman, Johnson, Silberstein and Tomczyk. Delmar Publishing
ISBN:9781428319363

**STUDY GUIDE for I.C.E.**
By Featherstone & Riojas - Pearson Prentice Hall; Publisher
Developmental Courses:
The Texas Success Initiative (TSI) is a statewide program designed to ensure that students enrolled in Texas public colleges and universities have the basic academic skills needed to be successful in college-level course work. The TSI requires assessment, remediation (if necessary), and advising of students who attend a public college or university in the state of Texas. The program assesses a student’s basic academic skills in reading, writing, and math. Passing the assessment is a prerequisite for enrollment in many college-level classes such as English 1301/1302, History 1301/1302, Math 1414, etc. Students who do not meet assessment standards may complete prerequisite requirements by taking developmental courses in the deficient area and passing them with a grade of C or higher. In some cases retesting will also be required. It is up to each student to be aware and informed about requirements that are subject to change. Additional information is available from the TSI Office. https://www1.dcccd.edu/cat0910/admiss/tsi.cfm?loc=4

Course Objectives:
The student will explain a reverse cycle; list the mechanical and electrical components for the heat pump operation. Explain the operation of heat pump modes including; cooling, heating, defrost, emergency heat, and auxiliary heat mode. The student will identify and explain different methods of accomplishing defrost; charge a system correctly in the heating and cooling mode; troubleshoot electrical and mechanical components; perform tests for adequate air flow; and determine balance point and C.O.P. (coefficient of performance).

Modules:
1. Reverse Cycle System Operations
2. Electric Components and Controls
3. Supplemental Heat
4. Geothermal Systems
5. Wiring Diagrams
6. Indoor Air Quality

Course Competencies:
The following list of course goals will be addresses in the course. These goals are directly related to the performance objectives (Addendum A). (*designates a CRUCIAL goal)
1. display punctuality (Personal Qualities F13.4)
2. display cooperative attitude (Personal Qualities F15.4)
*3. use safe habits (Resources C1.4)
use correct hand tools *(Personal Qualities F13.4)*

*clean work area (Resources C3.4)*

*list heat pump components
*identify heat pump components
*list heat pump types
*describe heat pump supply air temperature
*describe outdoor unit location
*list ways defrost is initiated
*list ways defrost is terminated
*determine balance point
*define COP
*describe ground source heat pump operating
*contrast cooling and heat pump metering devices
*describe liquid filter-dries
*contrast regular and heat pump thermostats
*list changes while in defrost
*test check valve operation
*perform leak detection
*check heat pump metering device operation
*record pressure and temperature readings
*analyze pressure and temperature readings
*repair refrigerant leak
*perform refrigerant recovery
*check heat pump refrigerant charge
*charge heat pump
*perform performance test
*draw heat pump ladder schematic
*write heat pump sequence of operation
*wire heat pump
*repair electric connection
*troubleshoot heat pump control circuit *(Technology C20.4)*
*troubleshoot heat pump line voltage circuit *(Technology C20.4)*
*troubleshoot defrost circuit *(Technology C20.4)*
*troubleshoot heat pump compressor *(Technology C20.4)*
*troubleshoot heat pump mechanical problems *(Technology C20.4)*
*troubleshoot four way valve *(Technology C20.4)*
*service heat pump
*replace blower motor
*replace relay
*critique trade publication *(Basic skills F6.4)*

**Course Evaluation:**
Your final grade will be made up of these parts:
Daily work, 100 points each
(Home work, pop quizzes, and other daily work)
Homework: You are expected to turn in the written assignments on time. All homework is due at the beginning of the next scheduled class, and will not be accepted if it is late.

Lab work
Lab assignments, 100 points each
(Part of the lab grade will be how well you work as a team member in the lab and selection of tools to perform lab.) *(Interpersonal C9-4 Technology C18-5)*

Laboratory Work: You cannot work in the lab if you do not have your required tools. The list of required laboratory tools will be given out in the first class meeting. You are expected to have your tools by the beginning of the second week of class. The laboratory work sheets are due at the end of each laboratory assignment. You are to work with your laboratory partner, working on the assignment until both of you have completed the assignment.

Your instructor will retain all of your lab work until the week before an exam. After the lab work is returned to you, these lab assignments will not be accepted for grade. NO EXCEPTIONS.

Students will be removed from labs if they do not have their safety glasses. The campus bookstore and several off campus stores have safety glasses for sale.

Lab Exam, 200 points each

Major Exams, 200 points each
Homework assignments, 100 points each *(Basic F2 -4)*

Final Exam, 300 points

Note: You must have average 70% on the written final exam and lab final exam in order to receive a passing grade in this course. *(Information C6-4)*

The core section of the I.C.E - REQUIREMENT

Exams: The exams will cover material from the assigned chapters in your textbook, quizzes, handouts and other assigned material. The exam can include multiple choice questions, true/false questions, fill-in-the-blank and short essay questions. There will be no make-up exam unless arrangements have been made with the instructor before the exam date! All assignments will be given a due date and will not be accepted late without a penalty.
Final: It is comprehensive, covering some material from the first two tests. The final can include multiple choice questions, true/false questions, fill-in-the-blank and short essay questions.

Note: You are expected to be here for each exam (Lab Exam, Major Exams, and Final Exam). You cannot “make-up” exams unless you have made specific arrangements with me before the scheduled exam. You MUST be present at the scheduled time for the final exam.

Quizzes: There will be quizzes and in-class assignments throughout the semester, covering material from your textbook, lecture and handouts. These quizzes and assignments may be announced or unannounced. There will NOT be any make-up for these quizzes.

Grade Breakdown:

- 100 to 90 % of total possible points = A
- 89 to 80 % of total possible points = B
- 79 to 70 % of total possible points = C
- 69 to 60 % of total possible points = D
- Below 60 % of total possible points = F

Obtaining Final Course Grades Using eConnect:
Final Grade Reports are no longer mailed. Convenient access is available online at www.econnect.dcccd.edu. Use your identification number when you log onto eConnect, an online system developed by the DCCCD to provide you with timely information regarding your college record. Your grades will also be printed on your Student Advising Report, which is available in the Admissions Office.

Eastfield College Email Policy:
Faculty and students must have and use a DCCCD account for all correspondence relating to academic coursework. For information on setting up a DCCCD student email account go to: https://www1.dcccd.edu/netmail/input_ssn.cfm

Course Outline:

This syllabus is intended as a set of guidelines for this course. Eastfield College and your instructor reserve the right to make modifications in content, schedule and requirements as necessary to promote the best education possible within prevailing conditions affecting the course.

1. Introduction – Safety – Safety Test
2. Basic Heat Pumps Theory.
3. Read before class 43.1 thru 43.8.
4. Read before class 43.9 thru 43.17.
5. Read before class, 43.18 thru 43.25. Answer questions #1 thru #9
6. Read before class, 43.26 thru 43.34. Answer questions #10 thru #17
8. Read before class 30.1 thru 30.15. Answer questions #1 thru #15.
   Review first exam.
9. First exam. Make-up lab day
10. Read before class 44.1 thru 44.6. Answer questions # 1 thru #9
11. Read before class 44.7 thru 44.11. Answer questions # 10 thru #18
12. Read before class 34.1 thru 34.6. Answer questions #1 thru #10
13. Read before class 34.7 thru 34.12. Answer questions #11 thru #20
14. Handout on Wiring Diagrams for Heat Pumps
16. Second exam. Make-up lab day
17. Handout on Heat Pump Installation and Start up.
18. Lab Exam. (MUST pass a minimum requirement, 70 points, in order to complete the HART 2449 course.)
19. Final Exam. (MUST pass a minimum requirement, 70 points, in order to complete the HART 2449 course.)

Attendance Policy:
You are expected to attend EACH CLASS MEETING, and you are expected to be here on time, prepared, with your book and materials. Please consult with me whenever an absence is necessary. If you miss a class, you are responsible to cover the missed material on your own. Have a classmate share notes with you and make sure you know about home work or other assignments due during the next class period.

Students who are receiving any form of financial aid should check with the Financial Aid Office prior to withdrawing from classes. Withdrawals may affect your eligibility to receive further aid and could cause you to be in a position of repayment for the
current semester. Students who fail to attend or participate after the drop date are also subject to this policy.

**Financial Aid Statement for Distance Learning Classes:**
If you are receiving Financial Aid grants or loans and are enrolled in a Distance Learning class, you must show participation in this class prior to the certification date by either e-mailing or contacting the instructor or logging on to eCampus. Do not drop or stop attending any class without consulting the Financial Aid Office. Changes in your enrollment level and failing grades may require that you repay financial aid funds.

**Repeating This Course: (Third Attempt to Enroll in a Course)**
Effective for Fall Semester 2005, the Dallas County Community Colleges will charge additional tuition to students registering the third or subsequent time for a course. All third and subsequent attempts of the majority of credit and Continuing Education/Workforce Training courses will result in additional tuition to be charged. Developmental Studies and some other courses will not be charged a higher tuition rate. Third attempts include courses taken at any of the Dallas County Community Colleges since the Fall 2002 Semester. See Third Attempt to Enroll in a Course at: [http://www.dcccd.edu/thirdcourseattempt/](http://www.dcccd.edu/thirdcourseattempt/)

**Academic Honesty Statement**
Scholastic dishonesty is a violation of the Code of Student Conduct. Scholastic dishonesty includes, but is not limited to, cheating on a test, plagiarism, and collusion.

As a college student, you are considered a responsible adult. Your enrollment indicates acceptance of the DCCCD Code of Student Conduct published in the DCCCD Catalog at [http://www1.dcccd.edu/cat0506/ss/code.cfm](http://www1.dcccd.edu/cat0506/ss/code.cfm)

Academic dishonesty includes, but is not limited to, cheating on tests, plagiarism and collusion. **Cheating** includes copying from another student’s test or homework paper, using materials not authorized, collaborating with or seeking aid from another student during a test, knowingly using, buying, selling, stealing, or soliciting the contents of an unadministered test, and substituting for another person to take a test. **Plagiarism** is the appropriating, buying, receiving as a gift, or obtaining by any means another’s work and the unacknowledged submission or incorporation of it in one’s own written work. **Collusion** is the unauthorized collaboration with another person in preparing written work for fulfillment of course requirements. Academic dishonesty is a serious offense in college. You can be given a failing grade on an assignment or test, can be failed for the class, or you can even be suspended from college.
Food and Drink Policy:
Food, drinks, and tobacco products are prohibited in Eastfield College classrooms.

ADA Statement:
Students with a physical, mental or learning disability who require accommodations should contact the college Disability Services Office in C237. Call 972.860.8348 or email efcdso@dcccd.edu. For more information: http://www.eastfieldcollege.edu/SSI/DSO/index.html

Religious Holidays Absences for observance of a religious holy day are excused. Notification of the absence must be given to the instructor in writing at least two weeks prior to the date of the holy day. A student whose absence is excused to observe a religious holy day is allowed to contract with the instructor to take a make-up examination or complete an assignment within at a mutually agreed upon time after the absence.

Withdrawal Policy:
If you are unable to complete this course, it is your responsibility to withdraw formally. The withdrawal request must be received in the Registrar’s Office by 11/29/2012. Failure to do so will result in your receiving a performance grade, usually an “F.” If you drop a class or withdraw from the college before the official drop/withdrawal deadline, you will receive a “W” (Withdraw) in each class dropped. For more information about drop deadlines, refer to the current printed Credit Class Schedule, contact the Admissions/Registrar’s Office at 972-860-7167 (Room C119), or contact the division office.

STOP BEFORE YOU DROP
For students who enrolled in college level courses for the first time in the fall of 2007, Texas Education Code 51.907 limits the number of courses a student may drop. You may drop no more than 6 courses during your entire undergraduate career unless the drop qualifies as an exception. Your campus counseling/advising center will give you more information on the allowable exceptions. Remember that once you have accumulated 6 non-exempt drops, you cannot drop any other courses with a “W”. Therefore, please exercise caution when dropping courses in any Texas public institution of higher learning, including all seven of the Dallas County Community Colleges. For more information, you may access: https://www1.dcccd.edu/coursedrops

Family Educational Rights and Privacy Act of 1974 (FERPA)
In compliance with the Family Educational Rights and Privacy Act of 1974 (FERPA), the College may release information classified as “directory information” to the general public without the written consent of the student. Directory information includes: (1) student name, (2) student address, (3) telephone numbers, (4) date and place of birth, (5) weight and height of members of athletic teams, (6) participation in officially recognized activities and sports, (7) dates of attendance, (8) educational institution most recently attended, and (9) other similar information, including major field of student and degrees and awards received. Students may protect their directory information at any time during the academic year. If no request is filed, directory information is released upon written inquiry. No telephone inquiries are acknowledged. No transcript or academic record is released without written consent from the student, except as specified by law.

**Classroom Etiquette:** *(There will not be any profanity in the classroom.)*

The classroom serves as a learning environment for everybody participating in this class. To facilitate academic and personal growth for everyone, you are expected to be courteous and respectful toward the instructor and other students. While I encourage an informal and friendly classroom environment that facilitates discussion and exploration, we must still accommodate one another’s differing perspectives and opinions.

Each student must adhere to the Student Code of Conduct. The Student code of conduct was passed out to each student at the beginning of this class. The Student Code of Conduct can be found in the current Eastfield College Catalogue, or on the web site.

Ringing cell phones during the class period are a distraction. Unless it is an emergency call from a family member, all other cell phone calls are to be avoided. Family members and friends should be advised not to call during class time. If a student continues to receive numerous cell phone calls during the class period, the instructor may request the cell phone be turned **OFF**.

A student that is on call by his/her company may answer cell phones in the classroom. The student will then remove themselves from the classroom for the conversation. All other calls are to be avoided. The instructor may amend this rule as he/she sees fit.

Voice mail and text messages can be retrieved during the break between class lecture and lab.

**Hazardous Material:**
You have the right to know that you may be working with, or in the presence of Hazardous Materials. A list of specific materials is posted on the “Green” Safety Bulletin Boards. Material safety Data sheets are available from the tool room.
Students will be trained on the safe handling of these materials. The student will be asked to sign off on completion of Hazmat training.

**Safety:**
Safety is a must in our classes. You will be trained in safety and asked to sign off upon completion of the training.

Eastfield College is providing a District Safety Video and the link: [http://video.dcccd.edu/rtv/DO/emergency_dcccd.wmv](http://video.dcccd.edu/rtv/DO/emergency_dcccd.wmv)

Also, DCCCD has a written instructions on what to do in an emergency and the link: [http://www.eastfieldcollege.edu/EOP.pdf](http://www.eastfieldcollege.edu/EOP.pdf)

Students can sign up for emergency alerts at this link: [http://www.dcccd.edu/current students/student services/emergalerts/pages/default.aspx](http://www.dcccd.edu/current students/student services/emergalerts/pages/default.aspx)

**Emergency Alert System:**
As a Dallas County Community College District student, you will receive an alert when an emergency occurs on your campus. Alerts are sent by email, as required by state law, when an unscheduled evacuation or closure of a DCCCD campus or office occurs because of bad weather, utility outages, police emergencies or other types of emergencies.

DCCCD has launched a new "opt-out" system. Our new opt-out system automatically will send alerts to your email address unless you specifically "opt out" by informing us that you do not want to receive alerts.

1. Log on to eConnect ([https://econnect.dcccd.edu/eConnect/eConnect](https://econnect.dcccd.edu/eConnect/eConnect)).
2. Under "My Personal Information," click on "DCCCD Emergency Alerts" (it's the second link down). You'll then see the Emergency Notification Information page.
3. Update your emergency email address, if necessary. Add your phone number (to receive a recorded phone call) and your text number (to receive a text message) if you want to receive alerts by those methods. Or, if you do not want to receive any alerts, choose the "Opt Out" selection.
4. Click "Submit." Log off.

The instructor reserves the right to amend this syllabus as necessary.