Eastfield College  
Career Technologies’ Division  
Spring Semester 2015  
Troubleshooting  
HART-2436-41501  
4 Credit Hours

Instructor: Don Sutton  
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Office: T147 Hours 6:30am-7:30am M-T-W, 4:30pm-5:30pm R, 11:00am-12:00pm F

Drop Date: 04-18-15  
Class Time: 5:30 pm to 10:55 pm Thursdays 01-22-15 to 05-14-15  
Lecture Room: T-108 Time: 5:30 pm to 8:10 pm  
Lab Room: T-104 Time: 8:15 pm to 10:55 pm

Division Office: T-143  
Division Phone: 972-860-7143

**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:

HART 2436 Air Conditioning Troubleshooting (4)  
This is a WECM Course Number.  
Prerequisite: HART 1441, HART 1445, HART 2449, or consent of instructor.  
An advanced course in application of troubleshooting principles and use of test instruments to diagnose air conditioning and refrigeration components and system problems including conducting performance tests. This course is cross-listed as HART 2336. The student may register for either HART 2436 or HART 2336, but may receive credit for only one of the two. (3 Lec., 3 Lab.)

TEXTBOOK:

Refrigeration and Air Conditioning Technology; 7th Edition, Delmar Publishing  
By Whitman, Johnson and Tomczyk. ISBN Number 978-1-111-64447-5

STUDY GUIDE for I.C.E.  
By Featherstone & Riojas - Pearson Prentice Hall; Publisher
This book is required for this course. Towards the end of this course the student will be required to take the I.C.E. test (Industry Competency Exam). *The ICE test is requirement for the completion of the HART 2436 – Heat Pump course.*

**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 130/1302, 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

**End of course Outcomes:**

Test and diagnose components, systems, and accessories; complete applicable documentation.

**Student Learning Outcomes:**

The HVAC industry is in need of trained, skilled service technicians who can accurately troubleshoot all types of cooling and heating systems. The ability to troubleshoot an air conditioning and heating system requires a good understanding of refrigeration and electrical basics. The successful service technician must develop a safe and organized approach to diagnostics using appropriate instrumentation and to be able to read, understand and troubleshoot any kind of wiring diagram.

**STUDENT CONTRIBUTIONS:**

Each student will spend at least 3 hours per week preparing for class. Attendance is critical in this class. Students should make every effort to be in class on time and prepared for class.

**CLASSROOM ENVIRONMENT:**

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 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.

**WRITING EXPECTATIONS:**
All homework assignments will be typewritten.
In completing homework assignments, you must type the question and the answer in one complete sentence/statement. No abbreviations or short words. Turning in a homework paper that does not meet these standards will result in the paper being returned to you with a comment to “Redo” or points will be deducted.

**EXAMPLE:**
*Question:* Define superheat.

*Your entry might be:* Superheat is the temperature of vapor refrigerant above its saturation-change of state temperature
*In one sentence this statement has given both the question and the answer.*

**Evaluation Procedures:**
Your final grade will be made up of these parts;

- Out of class assignment, 100 points each.
  (Homework, pop quizzes, and other daily work) 100 points each
  - 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.)

- Major Exams will be 200 points

- Final Exam will be 300 points
  - **Note:** You must average 70% on the written final exam and lab final exam in order to receive a passing grade in this course.

**Exams:** The exams will cover material from the assigned chapters in your textbook, quizzes, lectures, 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 three exams. The final can include multiple choice questions, true/false questions, fill-in-the-blank and short essay questions.
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:

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

Obtaining Final Course Grades Using eConnect

Grade reports are no longer mailed. Convenient access is available online at [www.econnect.dcccd.edu](http://www.econnect.dcccd.edu). Use your student 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: [http://www.dcccd.edu/netmail/home.html](http://www.dcccd.edu/netmail/home.html)

Student Learning Outcomes:

- Calibration of test equipment
- Troubleshooting basic controls
- Troubleshooting basic control circuits
- Troubleshooting electric motors
- Troubleshooting capacitors
- Troubleshooting belt drives
- Troubleshooting pulleys
- Troubleshooting voltage imbalance
- Troubleshooting low voltage
- Troubleshooting high voltage
- Troubleshooting air flow
- Troubleshooting compressors
- Troubleshooting refrigerant piping
- Troubleshooting restrictions in system
- Troubleshooting restrictions in driers
- Troubleshooting transformers
- Troubleshooting fans
- Troubleshooting drain lines
- Contrast between fuses
- Contrast between driers
- Contrast between wires
Contrast between suction pressure and superheat
Contrast between discharge pressure and ambient air
Contrast between air conditioning units and heat pumps
Contrast between direct drives and belt drives

COURSE POLICIES:

Attendance: 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 homework 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.

There will not be any profanity in the class room.

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 the Fall Semester 2005, the Dallas County Community Colleges will charge a higher tuition rate 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 higher 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/.

Preparation: You are expected to do the reading assignment before you get to class. There are several advantages to such an effort by you. You will have read the material, and the class will not have to spend time bringing you up to where the rest of the class is.

Daily Tests: You must be present in class each day when a daily test or pop quiz is given. You cannot “make-up” any daily test or pop quiz.

Major Tests: You are expected to be here for each 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.

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 partners, working on the assignment until all of you have completed the assignment.

**Safety Glasses:** Safety glasses are required in all HVAC lab classes where the student is working on operating equipment. Your instructor is charged with enforcing this policy. The toolroom will not issue safety glasses to students after they receive their initial p

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 for those students who can’t keep up with theirs.

**Homework:** You are expected to turn in the written assignments on time. All homework will have a due date on Blackboard, and will not be accepted if it is late.

**Academic Honesty Statement**

Scholastic dishonesty is a violation of the Student Code of 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://www.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.

However, according to Eastfield College procedures, if in a non-lab class setting, food and drink may be allowed. This is left to the instructor’s discretion.

No electronic cigarettes in class room or lab.

**AMERICANS WITH DISABILITIES ACT:**

It is the policy of Eastfield College to provide reasonable accommodations for qualified individuals who are student with disabilities. This college will adhere to all Federal, State and Local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student’s responsibility to contact Eastfield College Disability Services Office in C237, call 972-860-8348 or email efcdso@dcccd.edu, in a timely manner to arrange for appropriate accommodations.
ABSENCE FOR OBSERVATION OF HOLY DAYS:

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.

EMERGENCY & INCLEMENT WEATHER PROCEDURE:

In case of emergency or inclement weather conditions, Eastfield students should listen to KEOM-FM Radio station (88.5) as the primary media source. In partnership with the Mesquite Independent school District, Eastfield College Administration will notify KEOM immediately after a decision is made to cancel classes on any given day of inclement weather or for emergency purposes. Students may also monitor other local radio and television stations. The earliest an announcement may be broadcast on KEOM Radio is 6 a.m. Students may also refer to the Eastfield College web page www.eastfieldcollege.com for the Inclement Weather announcement under the Features area of the front page. The announcement will be posted immediately following the decision to close the college.

Withdrawal Policy

If you are unable to complete this course, it is your responsibility to formally withdraw. Each course has a specific drop date. For this class, the drop/withdrawal request must be received in the Registrar’s Office by the date at the top of the page.

If you drop a class or withdraw from the college on or before the official drop/withdrawal deadline, you will receive a “W” (Withdraw) in each class dropped. Failure to complete and official withdrawal by the assigned date will result in your receiving a performance grade, usually an “F.”

For complete information on the drop requirements, policies and procedures, refer to the current online college catalog at www.dcccd.edu at the following link https://www1.dcccd.edu/catalog/ss/oep/dw.cfm?use_nav=acad_info&loc=ecn

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 inquires are acknowledged. No transcript or academic record is released without written consent from the student, except as specified by law.

INCOMPLETEs:

An incomplete grade of “I” may be given when an unforeseen emergency prevents you from completing the work in a course. The “I” must be converted to a performance grade (A-F) within 90 days after the first day in the subsequent regular semester. If the work is not completed after 90 days, the “I” is converted to a performance grade, usually an “F”.

PRINTING ON CAMPUS:

Printing in the Computer Lab (L-108), Library, and Learning Assistance Center will cost 5 cents a page. Students must bring a $1.00, $5.00, $10.00, or $20.00 bill to the lab to create an account. Accounts must be created before attempting to print. No change is made in the lab. Once the money is in the bill acceptor, it cannot be retrieved. Cash refunds are not possible. Accounts stay active as long as the account has value.

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.

Air Conditioning and Refrigeration
Tool and Instruments list

Note: The supply and tool room does not have tools for student use.
The student must purchase tools within two weeks of the beginning of the first HVAC class.

General Tools:

- Safety glasses
- Leather gloves
- Tool box or pouch

Basic instruments:

Choose one of the following:

Any multimeter that will measure: Volts, Amps, Ohms, Temperature and Capacitance.

Examples of these meters are the following:

- Fluke 116/322 HVAC Comb. Kit
- Fieldpiece SC76 or SC77
- UEI DL379 or DL389
- Klein CL200 (this meter will only check capacitance 0-100 mfd)

Refrigerant Tools:

- Compound manifold gauge set with hoses and one 90° low loss fitting.
- Refrigerant valve core tool.
- (at some time during your training you will be required to purchase a second set of manifold gauges- this set will be used with refrigerant 410a ONLY.)

Hand Tools:

- 8 in. and 12 in. adjustable open-end wrenches
- Allen wrench set
- Refrigeration ratchet wrench & adapter
- 6 in. combination pliers
- Wire cutter pliers
- Crimping pliers
- Six in one screwdriver
- Fire place lighter
- Insulated test/jumper leads with alligator clips

IN ADDITION THE FOLLOWING TOOLS WILL BE NEEDED FOR HART-2438

- Ball peen hammer
- Laytex or vinyl gloves
- Cordless drill (with fully charged battery) and socket bits (1/4”, 5/16”, 3/8” and 7/16”)

Developed/Revised Dec. 12, 2013