Eastfield College
Career Technologies Division
Summer 2012
HART 1407
Principles of Refrigeration

Class: HART 1407-4701
Time: 5:45 PM to 10:10 PM, Monday – Thursday
Room: T101
Instructor: Richard McDonald
Cell Phone: 214-537-7548
Dates: 5/14-6/14
E-mail: powerman417@sbcglobal.net
Division Office: 972-860-7143

Guide to the NATE/ICE Certification Exams Third Edition
Robert Featherstone and Jesse Riojas

Course Description:
The student will demonstrate the refrigeration cycle; understanding of refrigeration components; implement industry standards in system charging procedure; implement industry standards in refrigerant recovery procedures.

STUDENT LEARNING OUTCOMES:
1: Understanding of safety rules and code of conduct
2: Understanding of the theory of heat
3: Understanding of the role that matter and energy plays in heat transfer
4: A study of the refrigeration system and refrigerants used.
5: An understanding of the procedure used in system evacuation
6: An understanding of the process of system charging
7: A study of the various charging calculators
8: An understanding of the various types of evaporators
9: An understanding of the various types of condensers
10: An understanding of the various types of compressors
11: An understanding of the various types of expansion devices
12: An overview of refrigerant management as it pertains to the EPA
13: An understanding of the calculation of various test instruments
Prerequisites: None

Course Grading/Evaluation Procedure:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid term Exam</td>
<td>100</td>
</tr>
<tr>
<td>1 Final exam</td>
<td>100</td>
</tr>
<tr>
<td>Laboratory assignments</td>
<td>100</td>
</tr>
<tr>
<td>Homework and class work</td>
<td>100</td>
</tr>
<tr>
<td>Daily Test</td>
<td>100</td>
</tr>
<tr>
<td>Lab Exam</td>
<td>100</td>
</tr>
</tbody>
</table>

Total of these grade points equal grade number points.

Grading Scale:

- 540 - 600 points = A
- 481 - 539 points = B
- 420 - 480 points = C
- 359 - 419 points = D
- 0 - 358 points = F

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-blanks, and short essay questions.

Final: It is comprehensive, covering some material from the mid term and daily exams. The final can include multiple choice questions, true/false questions, fill-in-the-blanks, and short essay questions.

Daily Test: There will be daily test and in-class assignments throughout the semester, covering material from your book, lecture, or handouts. These daily test and assignments may be announced or unannounced. There will not be any make-ups for daily test.

Participation: You are expected to participate in class activities, such as class discussions or group assignments. Failure to do so will negatively affect your grade.

Attendance: You are expected to attend all classes. However, you are allowed to miss one (1) class without being penalized. Further missing of classes will result in a penalty of 4 points per absence. You are expected to be on time for each class. However you are allowed to be late one class without being penalized. Further being late will result if 1 point penalty for each class you are late.

Getting in Contact:

- If you have any questions, please e-mail me, or call me at the numbers provided on the front page.
Should you feel the need to see me in person, please contact me either before or after class.

Course Policies:
You, the student, are expected to follow these policies:

- You are responsible for reading the assigned chapters before you come to class and the unit questions are due on the date listed on the calendar.
- You are expected to participate in class discussions and labs.
- You are expected to be on time; late arrival disrupts class activities.
- 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 works or other assignments due during the next class period.
- You are expected to be present for exams. Make-ups are arranged on a case-by-case basis. You are responsible for contacting your instructor to make arrangements, preferably before you miss. You will not automatically be granted the opportunity to make up an exam.
- You are expected to turn your work and labs in on time. There will be no late work accepted after two weeks from the due date and late work will be penalized.
- You instructor will retain all of your work and exams until 2 weeks before the end of the semester at which time, there will be no late work accepted, no exceptions.
- Do not plagiarize. You become guilty of plagiarism when you submit somebody else's work and/or words as your own. Plagiarism is a serious violation of the student ethical code and will result in measures reaching from a grade “F” for the assignment in question to being dropped from or failed in this class.
- Do not cheat. If you copy another student's work, then this will be treated in the same way as plagiarism.
- Adhere to the Student Code of Conduct, to be found in the current Eastfield College Catalogue, or on the web site https://www1.dcccd.edu/cat0203/ss/code.cfm.
- This 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 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.

Campus Policies:

- **ADA Disability Accommodation**
  Students requiring accommodations due to the presence of a disability must identify themselves in a timely fashion and demonstrate/document the need for accommodation at the Services for Special Populations Office. For information regarding the rights and responsibilities of students with disabilities, contact SSPA at 972-860-7032.
• **Emergency & Inclement Weather Procedures**
  In case of emergency (power outage, air conditioning failure, fires, etc.) or inclement weather conditions, Eastfield students should listen to KEOM-FM station (88.5) as the primary media source. 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 is 6:00 a.m.

**REPEATABILITY ISSUE:**

Pending legislative action and Dallas County Community College District Board approval, 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 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. For complete information and updates, go to [http://www.dcccd.edu/ThirdCourseAttempt/](http://www.dcccd.edu/ThirdCourseAttempt/).

**STUDENT E-MAIL:**

Legal privacy issues prevent your instructor from discussing your work or your grades on commercial e-mail accounts. If you wish to send your papers as attachments to an e-mail (and the instructor permits it), or if you have a question about your grade, you must open a student e-mail account. The account is free. You may set it up by going to [www.dcccd.edu](http://www.dcccd.edu) and click on Student Services, Online services, and Student Net Mail. All students receiving financial aid must open a student Net Mail account.

**Resources and services available to YOU:**

- **Library** – Offers a wide variety of resources for research, recreational, and educational use, including books, magazines, videos, computer databases, and internet has computers for student use.
  
  Location: L Building, 2nd floor
  
  Hours: M-Th 8:00 a.m. – 10:00 p.m., F 8:00 a.m. – 4:30 p.m., Saturday 9:00 a.m. – 2:00 p.m.

- **Educational Planning** – provide advisors and counselors to help you plan your class schedule and develop a specific two-year educational plan that will maximize the benefits of your classes and maintain course equivalency if you intend to transfer to a four-year institution.
  
  Location: L Building, 2nd floor
  
  Hours: M-Th 9:00 a.m. – 7:00 p.m., F 9:00 a.m. – 4:30 p.m.

**OBTAINING YOUR GRADES AT THE END OF THE SEMESTER:**
Grade reports are no longer mailed. Convenient access is available online or by telephone. Just use your student identification number when you log in to e-Connect or call DCCCD Touch Tone Service. Web site address: http://www.econnect.dcccd.edu/

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.

DCCCD Drop Policy:
SIX DROP ISSUE
SYLLABUS STATEMENT
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

If you consider dropping this class, please talk to me immediately!
Many times, there might be a better alternative than dropping a class, and I will be glad to help you in any way I can, or put you in touch with someone who can.

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 June 6, 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.

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.

Religious Holidays
Absences for observance of a religious holy day are excused. 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 a reasonable time after the absence.

Profanity in Class Room
There will not be any profanity used in the class room.

Hazardous Materials: 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.

Financial Aid Statement
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.

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. 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.

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.
The following is a list of tools required of students enrolled in the HART program. Each student must furnish a set of hand tools and instruments for laboratory performances in all HART classes. Tools may not be shared between students. The ACR supply room does not have tools for students use. If you take certificate one or greater, you will need all of these tools.

**GENERAL TOOLS**

1. Safety glasses
2. Portable Tool Box

**BASIC INSTRUMENTS**

3. Volt-ohm meter w/temperature measuring capabilities and capacitance measuring capabilities at least 200 MFD with Clamp-on ammeter
4. Pocket thermometer, Digital -55°F to +480°F

**REFRIGERANT TOOLS**

5. Compound manifold refrigerant gauge set w/low loss fittings
6. Valve core removal tool (allows removal & replacement of valve core with system under pressure)

**HAND TOOLS**

7. 8" adjustable wrench
8. 12" adjustable wrench
9. Refrigeration ratchet wrench, 3/16, 1/4, 5/16, & 3/8 w/square openings
10. Hex key bit for refrigeration wrench with 3/16 & 5/16 hex bit in one tool
11. Open-end wrench set including 1/4, 3/8, 7/16, 1/2, 9/16, 5/8, & 3/4
12. Nut driver set with hollow shaft, long shank 3/16 into 1/2"
13. "T" channel locks pliers
14. Wire cutters pliers 7"
15. Long nose pliers 6"
16. Crimping pliers (to crimp insulated & uninsulated solderless terminals)
17. Screwdriver combination 6-in-1 (Phillips, flat blade, 1/4" & 5/16" nut drivers)

Tentative Assignments

May 14
Go over syllabus an talk about the requirements of class, watch video on MSDS sign Material and safety data sheet and code of conduct sheet will be given hound out on safety to read and study for next class read, study in Guide to the NATE/ICE book, personal safety and refrigerant safety pages 3,4,6 and 7 and in R.A.C.T Unit 4, 4.1, Ladder safety, 4.3,4.4,4.5,4.6,4.7,4.8. Answer questions 1 thru 5,8,11 thru 15 for next class.

May 15
Watch Video on Safety, go over homework questions, and take test over reading assignment. Study and read in Guide to the NATE/ICE book Hand tools page 4, read hand out AC Tools and Measurements and in R.A.C.T Unit 5, answer review questions at the end of Unit 5.

May 16
Watch movie on Basic air conditioning tools and measurements. Discuss the reading assignment, and take daily quiz over reading assignment, go over daily test and discuss the answers to quiz. Do Lab 1. Will be given hand out reading assignment, Will be given hand out on Energy and Heat to read before next class.

May 17
Watch movie on air conditioning heat transfer and cooling. Go over hand out take quiz over hand out. Go over questions on quiz Do Lab 2 Read in Guide to the NATE/ICE book Refrigeration Theory pages 7 and 8. Read Unit 1 in R.A.C.T. and answer questions at the end of the Unit for the next class.

May 21
Discuss Unit 1 and go over homework questions at the end of Unit 1, Take daily quiz over reading assignment, go over answers to quiz. Do Lab 3. Read and study handout Forms of a Substance before next class.

May 22
Watch movie on basic air conditioning components. Go over hand out and take quiz over hand out. Do Lab 4. Read and study Unit 2 in RACT and answer questions at the end of Unit 2 for next class. Will be given hand out to read and study for next class, Pressure, Refrigerants & Air Conditioning.

**May 23**
Watch movie on basic air conditioning circuits. Discuss Unit 2 in RACT and go over homework questions at the end of Unit 2. Take daily quiz over reading assignment; go over answers to daily quiz. Do Lab 5. Will be given hand out to read and study for next class, Basic Refrigeration Circuits.

**May 24**
Watch movie on Basic refrigeration circuits. Discuss the reading assignment and take daily quiz over reading assignment, go over answers to reading assignment. Do Lab 6. Read Unit 3 and answer the questions at the end of Unit 3 in the RACT before the next class. Will be give a handout on Brazing to read before next class.

**May 29**
**Mid Term Exam**

**May 30**
Watch film on brazing, discuss Unit 3 in RACT and go over the home work questions, take quiz over reading assignment. Discuss the answers to the daily quiz. Do Lab 7. Will be given hand out on superheat and subcooling to read and study before next class.

**May 31**
Watch movie on superheat and subcooling, discuss reading assignment, take daily test on reading assignment. Do Lab 8. Read Unit 8 and answer the questions at the end of Unit 8 in the RACT before the next class. Read in Nate/ICE guide pages 19 and 20 Manifold gauges and System Evacuation before next class.

**June 04**
Discuss Unit 8 and go over home work questions, take daily quiz over reading assignment, go over answers to daily quiz. Do Lab 9. Will be given Hand out on Evacuation Charging and Checkout to read before next class.

**June 05**
Watch movie on basic air conditioning evacuation, charging and checkout, go over hand out in class. Take daily test over reading assignment. Do Lab 10. Read and study Unit 10, answer questions at the end of Unit 10 in RACT, Read in Nate/ICE Guide page 20 and 21 on refrigerant charging.
June 06
Discuss Unit 10 and go over homework questions, take daily quiz on reading assignment, go over answers to daily quiz. Do Lab 11. Read and study Unit 9 and answer questions at the end of Unit 9 in RACT, read in NATE/ICE Guide pages 17 and 18. Recovery equipment before next class.

June 07
Discuss Unit 9 and go over homework questions, take daily quiz over reading assignment, go over the answers to daily quiz. Do Lab 12. Read and study Unit 11 in RACT and answer questions at the end of Unit 11.

June 11
Discuss Unit 11 and go over the homework questions, take daily quiz over reading assignment, go over the answers to daily quiz. Do lab 13.

June 12
Watch video and do work book on Refrigeration Fundamentals For HVAC/R Technicians.

June 13
Lab Final

June 14
Final exam over previous units and hand outs studied. Hand in folders with homework from units in book and all Labs signed by me. (put nothing else in the folder, there will points taken off if other material is in the folder.)