Course Information

<table>
<thead>
<tr>
<th>Hart 1407 33711</th>
<th>Refrigeration Principles</th>
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<tbody>
<tr>
<td>Term</td>
<td>Spring 2015</td>
</tr>
<tr>
<td>Division</td>
<td>Business / Technology</td>
</tr>
<tr>
<td>Classes will meet</td>
<td>01/20/2014 - 02/24/2014</td>
</tr>
<tr>
<td>Class Start time</td>
<td>6:00PM to 10:15PM MTWR</td>
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Instructor Information

<table>
<thead>
<tr>
<th>Tim Greenberg</th>
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<tbody>
<tr>
<td>Email Address–<a href="mailto:TGforChrist@hotmail.com">TGforChrist@hotmail.com</a></td>
</tr>
<tr>
<td>Telephone</td>
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Course Description

An introduction to the refrigeration cycle, Basic thermodynamics, heat theory, Temperature / pressure relationship, safety, refrigeration containment, and refrigeration components. This course transfer is cross-listed as HART 1307 and HART 1507. The student may register for HART 1307, HART 1407 or HART 1507 but may receive credit for only one of the three

Required Materials Including Textbooks (include ISBN)

- Refrigeration and Air Conditioning technology 7th edition (Whitman, Johnson, and Tmoczyk)
- Three ring loose leaf binder
- 5 subject spiral notebook
- Scientific Calculator (NO Cell Phones)
- Flash Drive (memory stick)
- Red Ball Point pen

Course Prerequisites

None

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

Student Learning Outcomes

Identify refrigeration components; explain operation of the basic refrigeration cycle and heat transfer; demonstrate proper application and/or use of tools

Grading Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
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<tbody>
<tr>
<td>A</td>
<td>895-1000</td>
</tr>
<tr>
<td>B</td>
<td>795-894</td>
</tr>
<tr>
<td>C</td>
<td>695-794</td>
</tr>
<tr>
<td>D</td>
<td>595-694</td>
</tr>
<tr>
<td>F</td>
<td>Below 595</td>
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Exam & Assignment Weighting

1. Major exams, 2@ 200 points each 400 points
2. Laboratory 200 points
3. Laboratory Exam 100 points
4. Tool Test 100 points
5. Homework 100 points
6. Pop Tests 100 points

TOOLS

Tools are Due on Thursday Jan 29th (No exceptions)

Bonus options

An additional 50 points can be earned by using the tutoring services provided by the Air Conditioning Program. An additional 10 points for every 6 hours
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 (02/17/14). 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. See institutional policies for additional information on withdrawals.

Attendance Policy

You are expected to attend class regularly and consult with the instructor whenever an absence is necessary. An exam will be given at the end of each of the two units in the syllabus. You cannot “make-up” exams unless you have made specific arrangements with the instructor before the scheduled exam.

Emergency Closings

When the campus closes due unforeseen circumstances course work and instructions will continue using e-campus and emails to communicate.

Classroom Policies

Cell phones will be set to vibrate/silent mode and if an emergency require the call be answered student should exit classroom before answering call so that class is not disrupted. Due to the length of the Class session drinks and snacks are permitted however you do not have a maid and you are required to keep classroom neat and orderly.

Academic Honesty

Academic honesty is expected, and integrity is valued in the Dallas County Community Colleges. 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.

ADA Statement

If you are a student with a disability and/or special needs who requires accommodations, please contact the college Disability Services Office at 972-860-8119.

Emergency Alert

Sign up for DCCCD Emergency Alerts to receive a text-message, e-mail and/or phone call when there is an unscheduled evacuation or closure of a DCCCD campus or office because of weather closures, utility outages, police or other emergencies. Subscribing is free, but standard text message charges from your cell phone provider will apply. Please refer to: http://www.dcccd.edu/current%20students/student%20services/emergalerts/Pages/default.aspx

Financial Aid

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.
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 take a make-up examination or complete an assignment within a reasonable time after the absence.

Repeating this 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. This class may not be repeated for the third or subsequent time without paying the additional tuition. Third attempts include courses taken at any of the Dallas County Community Colleges since the fall 2002 semester. More information is available at: https://www1.dcccd.edu/catalog/ss/oepthird_attempt.cfm

Student Code of Conduct
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. More information is available at https://www1.dcccd.edu/cat1011/cattoc.cfm

Tutoring Services
Tutoring will be held in the Lab every Fri, and Sat. From 8:00AM – 12:00 Noon

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 six 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 six 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/coursedops

Honors Credit Availability
You can earn Honors Credit in this course that will show the completion of an Honors Course on your transcript. Honors credit is important in transfer evaluation for graduation with both Associates and Bachelor degrees with honors. To gain Honors credit for this course you will need to:

1. Demonstrate advanced writing skills through synthesis and original thought in expanded writing projects, research papers, and critical essays. This will entail a minimum of ten pages of writing. You will be asked to read primary sources readings besides the textbook
2. Participate in an outside class activity by attending a lecture, exhibit or program outside of the class activities
3. You will practice your oral presentation skills with a 10-minute presentation to the class about a topic that you have researched

To qualify for Honors credit, you must sign an Honors Contract at the beginning of the semester. Meet with me to design your program and complete the contract form by September 12 in order to meet the September 15 deadline for submission of Honors Contracts for approval. Finally, you must earn an A or B in the course in order to receive Honors Credit.
Course Outline

For maximum success in this course you should spend a *minimum* of 9 hours per week working on course material.

**Unit 1**

Order of operation
Refrigeration
Heat and cold
Temperature
Fahrenheit
Heat transfer
Conduction
Convection
Radiation
British Thermal Unit (BTU)
Sensible Heat
Change of state
Latent Heat
Saturated
Superheated
Sub-cooled
Ton of refrigeration
Pounds per square inch gauge
Pounds per square inch absolute
Inches of mercury vacuum
Specific heat multiplier
Ambient temperature
State the specific heat for water, ice and steam
Calculate order of operation problems  [OrderOp.xls](#)
Calculate sensible heat problems  [Sensible.xls](#)
Calculate latent heat problems  [Latent.xls](#)
Calculate combination of sensible and latent heat problems  [SenLat.xls](#)
Calculate tons of refrigeration  [Tons.xls](#)
Convert psia to psig  [PsiaPsig.xls](#)
Demonstrate use of the R-22 temperature-pressure chart  [R22 TP Conv.xls](#)
Charts are available here  [R22 Temp-Press Chart.xls](#) [R410a Temp-Press Chart.xls](#)
Demonstrate use of the R-410a temperature-pressure chart  [R410a TP Conv.xls](#)
Demonstrate the use of safety procedures in the laboratory  [lab 1](#)
Become oriented to the safety features in the laboratory  [lab 2](#)
Describe how to control saturation temperature
Determine if refrigerants are saturated, superheated or sub-cooled  [SupSub.xls](#)
Describe the purpose of an evaporator
Describe the purpose of a condenser
Describe the purpose of a compressor
Describe the purpose of a metering device
Draw a refrigeration cycle
State the condition of the refrigerant as it enters and leaves each component of refrigeration cycle
Describe how to charge on the low side of the system
Describe how to charge on the high side of the system
Describe the dangers of charging on the high side
Calibrate manifold gauges
Calibrate thermometers
Demonstrate how to use a gauge manifold
Identify the basic components of a refrigeration cycle
Calibrate manifold gauges
Demonstrate how to charge on the low side of the system
Describe flash gas
Describe the operation of a muffler
Describe the purpose of a filter dryer
Identify the suction line
Identify the hot gas line
Identify the liquid line
State the normal temperature range for an evaporator on a central air conditioner
State the normal superheat at the evaporator on a central air conditioner
State the normal difference in temperature between the ambient temperature and condenser temperature on a central air conditioner
Determine if an air conditioner is running normally

UNIT 2

Diagnose the following refrigeration cycle problems.
Low air flow across the evaporator
Low charge
Low air flow across the condenser
Overcharge
Restriction pass the condenser
Other restrictions
Low capacity compressor
Simulate low air flow across the evaporator
Simulate low air flow across the condenser
Check the operation of an air conditioner with a low charge
Simulate a refrigerant restriction past the condenser

Define the following terms as they relate to refrigerants:
Refrigerant
Miscibility
Free water
Toxicity
Flammability
Chlorofluorocarbons
Hydrofluorocarbons
Hydrochlorofluorocarbons
Hydrocarbons
Azeotropic mixture
Ternary
Zeotropic
Temperature Glide
Fractionation
Migration
Ozone Depletion Potential (ODP)
Miscibility
Recovery
Recycle
Reclaim
Vent
Describe the purpose of a crankcase heater
List 3 toxic refrigerants
List 3 flammable refrigerants
Apply refrigerant classifications
List safety precautions when working with refrigerants
State what happens when a refrigerant comes in contact with an open flame
Discuss the hazards of releasing chlorinated fluorocarbons to the atmosphere and its effects on the ozone layer
List a common application for R-22
List a common application for R-123
List a common application for R-717
List a common application for R-410a
List a common application for R-134a
Describe the ways moisture enters a system
List two ways moisture may exist in refrigeration system
Describe the methods for removing moisture
Describe the purpose of liquid line filter dryers
Describe the purpose of suction line filter dryers
List the harmful effects of moisture in a system
Demonstrate the proper use of a vacuum pump
Demonstrate how to charge on the high side of the system
Discuss the causes of compressor failures
Describe and demonstrate a triple evacuation
Demonstrate the use of a refrigerant recovery system

lab 11
QUALITY ENHANCEMENT PLAN

Cedar Valley College's Quality Enhancement Plan is designed to improve student learning in mathematics. Read more about our QEP at: www.cedarvalleycollege.edu/QEP

INSTITUTIONAL POLICIES

Health Center Services

- Confidential “talks”
- Over-the-counter medications for headaches, fever, seasonal allergies, and colds
- Blood Pressure check
- Coordination with outside health agencies such as Carter Blood Care; Dallas County Health Dept. (HIV/STD testing--free, twice a semester); UT Southwestern mobile mammography; Immunizations once a month for children <19 y.o. from the DCDHHS; Agape Massage; and Employee Wellness
- AED (Automatic External Defibrillator) for CPR
- Rest area for stress relief, migraine headaches, post seizure activity
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- Emergency sanitary pads
- Basic first aid for minor cuts, scrapes, insect stings, and heat, etc.
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designed to improve student learning in mathematics.

Cedar Valley College’s Quality Enhancement Plan is

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