

AUSTIN COMMUNITY COLLEGE
Heating, Air Conditioning & Refrigeration Technology
HART 2441 Commercial Air Conditioning

00 Syllabus

(rev. 01/06/2014)

Course Textbook: (*Modern Refrigeration and Air Conditioning 19th Edition*)

ISBN: 978-1-60525-199-4 sold at the Acc bookstore. Course packets are sold at the Acc bookstore.

Course Lessons: “*HART2441 Commercial Air Conditioning* . Course packets are sold in the HART Department.

(Provided) ***TECUMSEH HERMETIC COMPRESSOR SERVICE DATA BOOK***

Tools: good quality (digital preferred) multimeter

Dress: casual work attire

Course objectives:

The main objectives of this course are to provide the student with skills and practice in troubleshooting and repairing malfunctioning air conditioners. This objective will be accomplished by the following methods;

- Actual practice in troubleshooting and repairing faulty machines
- Drawing and analyzing electrical and mechanical circuits
- A review of theory and lab skills received in previous courses is included to reinforce student mastery of the subject.

Improving Your Grade: A low grade on a lab exercise may be improved by repeating the lesson- instructor issues a new one. Your new grade will be calculated by adding the two scores together and dividing by two. The new grade will not exceed 70.

Course grade is established by the following:

Laboratory work	34%
10-minute tests	33%
Mid-course test	13%
Final test	20%

Grading Policy:

- Grade of A - Maintain an average grade of 90% to 100%
- Grade of B - Maintain an average grade of 80% to 89%
- Grade of C - Maintain an average grade of 70% to 79%
- Grade of D - Maintain an average grade of 60% to 69%
- Grade of F - Average grade below 60%

To receive a grade of A, B, C or D, the student must complete all tests. Any uncompleted lab exercises will be figured into the course grade average with a grade of "0".

Progress Record: The progress record shows you what exercises you need to work on, what exercises you have completed and indicates when you need to take tests. By recording your grades, it will enable you to compute the grade you will earn in the course.

It is your responsibility to monitor your progress and to insure that your work is completed and turned in to your instructor in a timely fashion. Your instructor maintains a progress record on your work.

The lessons should be completed in the sequence they are listed on the progress record. You are encouraged to do as much of the “theory” lessons outside of class as possible. Feel free to proceed past the labs when doing the “theory” lessons.

Labs: The labs (some exceptions) are to be completed in the classrooms. Therefore, you are encouraged to have all “theory” lessons which proceeds a lab completed before coming to class. You should also read through the labs before class so that, when you come to the classroom, you are ready to begin working on the lab.

You will turn in all labs for grading. Your instructor will mark all incorrect answers and record a grade on the paper. It is your responsibility to correct all missed answers, however your instructor probably will not re-grade the work. Feel free, however, to ask him to verify the accuracy of your corrected answers. Do not study a lesson (preparing for test) until all answers are CORRECT.

Quality of Work: It is assumed that each student taking these courses intends to obtain employment in the HART industry. For this reason, it is expected that the student is here to *learn the subject* rather than *just make the grade*. Therefore, the student is encouraged make every effort to master the material rather than to just copy the answers. Remember, a degree or certificate may help you get a job, but it’s your knowledge, skills and attitude that allow you to keep the job.

Instructional Material: The instructional material includes reading assignments from the textbook and lessons which have been developed by your instructors. Most instructional material contains questions you are to answer as you read the material.

Answer Keys: Answer keys are provided in the lab so that you can grade your own lessons. You will be expected to turn in the lessons so that your instructor can keep up with your progress, but he WILL NOT grade your lessons. It is your responsibility to insure that every answer is CORRECT.

Notebook: Please keep all of your lessons in a notebook and bring all the material with you when you come to class. Insure that your name is on all papers and in your notebook. Also it is suggested that you write your name and telephone number in your textbook in ink. Any other items brought to class, such as multimeters should also have your name firmly affixed.

Instructor Assistance: The instructor is in the lab to assist you as needed. It is not his intent, however, to "take you by the hand" and lead you through the course. Ask for his assistance as you need it. But keep in mind that he is there to assist you, not do the work for you. If you have not already learned to take the initiative and to work on your own, your instructor will begin "pulling back" so that you will have to work more independently.

Study Tip: This is a wise study tip:

- Insure that every answer on every handout is CORRECT.
- Review every completed exercise at least one every week.
- Before taking a test, be sure you can answer every question on every handout and that you have a good understanding of all the reading assignments. The tests cover reading assignments, instructional material and lab exercises.

Turn in each exercise as it is completed. As soon as all exercises leading up to a test have been returned by your instructor, make your corrections, study the material and take the test.

Do not put off taking a test! If you experience difficulty in attending class, because of work or illness, etc., or you need extra assistance in completing the course work, talk to your instructor. He will not be very receptive to your problems if you say nothing until the last week of the semester.

Lab Policies include:

- The instructor must be in class when any lab work is performed. Students are not to perform lab work outside of normal class times
- Shop clean up begins 10 minutes before end of class. All lab work should stop at that time. A student must clean up spills or mess he creates
- Student must pass welding test before using welding equipment
- Student must wear goggles when using grinder, drill, soldering or working with refrigerant

Grade of I (Incomplete): A student may receive a grade of "I" if the student has **no** unexcused absences and has completed at least 75% of the required course work. The student must meet with the instructor and request the grade of incomplete.

If the instructor agrees that you have put forth your best effort but due to extenuating circumstances you were unable to complete the course, the instructor will grant a grade of "I".

Grade of W (Withdrawal): When a student is unable to complete the course and does not qualify for a grade of "I", the student should consider withdrawing from the course. ***It is the student's responsibility to initiate withdrawal procedures.*** Do not rely on the instructor to perform this service for you.

If a student stops attending, or otherwise fails to complete the course, and does not withdraw, the student will receive a grade of F.

Absences: Your instructor may initiate withdrawal procedures and assign a grade “W” if you accumulate as many as four unexcused absences.

Absences can be made up and your instructor will work with you in arranging to make up absences. To make up an absence you must attend a class other than the one you are registered in. You should request permission of the instructor whose class you wish to attend. At the close of the class, present the instructor with a "Class Attendance Form". Have the form filled out so that the instructor need only sign the form. Return the signed form to your official instructor.

Excused Absences: Verifiable family emergencies, illness or hospitalization constitute excused absences. A prolonged illness or situation which will prevent attendance of many classes may require the student to withdraw rather than receive a grade of “I”. These situations should be discussed with your instructor.

Testing: Tests will be given as you progress thru each course. Be sure to check with your instructor for his specific testing requirements. The tests are multi-choice or fill-in-the-blank type questions and performance of job skills.

Lab work will account for 34% of the final grade. Mid-course test is 13% of the final grade. Final test is 20% of the course grade. 4 section tests account of 33% of the course grade.

What Each Test Covers: Each *section* test covers the material following the previous section test up to the next test. The mid-course exam covers all material up to that point and the final exam covers the entire course.

This course and the following Air Conditioning courses are highly technical. Because of their technical nature, technical terms must be used. It is important that you learn the meaning of the technical terms and use them correctly. Misinterpretation or misuse of the terms can result in your work begin graded incorrect.

Importance of Good Grades: The grade you earn in this and any other courses you take are recorded on your transcript. You must maintain passing grades to be allowed to continue in college. A grade of F must be offset by a grade of A to average a "C" (assuming equal credit hours in each course).

If you are unable to complete this or any other course, your best advice is to withdraw from the course. A grade of W does not count against you.

Improving Your Grade: The minimum acceptable lab grade is 70. Labs with grades below 70 must be corrected and resubmitted for grading. Your new grade will be calculated by adding the two scores together and dividing by two. The new grade will not exceed 70.

Important!

Ohm Meter Required: Labs in this course require the use of a multimeter. The meter should be capable of measuring resistances as small as 0.5 Ω and as high as 20M Ω or more. Please talk to your instructor before purchasing a meter.

State of Texas License: The Texas Legislature has passed a bill authorizing state licensing of Air Conditioning/Heating personnel. The license became mandatory in January 1986. Cities presently requiring licensing may elect to continue or discontinue municipal licensing. If a municipality continues their licensing, the work can be done within that municipality with only the city license. The State License authorizes work anywhere within the state, regardless of city licensing. The state requires a minimum of four years experience before applying for the state examination for licensing. The state recognizes time in the ACC ACR courses as credit toward work experience.

The Department of Licensing and Regulation is the agency which administers the license. They are listed in the telephone book, blue pages under GOVERNMENT OFFICES-STATE. See LICENSING AND REGULATION-TEXAS DEPARTMENT OF. Under this heading is AC/Refrigeration Licensing.

L.P. Gas License: A separate license is required for anyone working on liquid petroleum (L.P.) systems such as butane or propane. The license is issued through the Texas Railroad Commission. Their telephone number is in the telephone book under GOVERNMENT OFFICES-STATE. Find L.P.G. Division under RAILROAD COMMISSION)

Federal Requirement for Technician Certification: In April, 1993 the *Environmental Protection Agency* approved the final rule on refrigerant recovery and recycling. The final rule includes mandatory technician certification. The certification includes four levels;

Type I - for servicing small appliances

Type II - for servicing or disposing of high or very high pressure appliances

Type III- for servicing or disposing of low-pressure appliances

Type IV- (Universal) for servicing all types of equipment

This certification is obtained by passing an examination approved by the EPA. Seminars, ranging from 1/2 day to full day are providing by various agencies, including Austin Community College faculty. The seminar prepares you for the exam.

Scans Competencies - Heating, Air Conditioning, & Refrigeration Technology

Principles of Air Conditioning	HART 2441	Principles of Air Conditioning	HART2441
1.0 Resources		5.0 Technology	
1.1 Manages Time	X	5.1 Selects Technology	X
1.2 Manages Money		5.2 Applies Technology to Task	X
1.3 Manages Materials and Facility Resources	X	5.3 Maintains and Troubleshoots Technology	X
1.4 Manages Human Resources		6.0 Basic Skills	
2.0 Interpersonal		6.1 Reading	X
2.1 Participates as a Member of a Team	X	6.2 Writing	X
2.2 Teaches Others	X	6.3 Arithmetic	X
2.3 Serves Clients/Customers		6.4 Mathematics	X
2.4 Exercises Leadership	X	6.5 Listening	X
2.5 Negotiates to Arrive at a Decision	X	6.6 Speaking	
2.6 Works with Cultural Diversity		7.0 Thinking Skills	
3.0 Information		7.1 Creative Thinking	X
3.1 Acquires and Evaluates Information	X	7.2 Decision Making	X
3.2 Organizes and Maintains Information	X	7.3 Problem Solving	X
3.3 Uses Computers to Process Information		7.4 Mental Visualization	X
4.0 Systems		7.5 Knowing How to Learn	X
4.1 Understands Systems	X	7.6 Reasoning	X
4.2 Monitors and Corrects Performance	X	8.0 Personal Qualities	
4.3 Improves and Designs Systems		8.1 Responsibility	X
		8.2 Self Esteem	X
		8.3 Sociability	X
		8.4 Self-Management	X
		8.5 Integrity/Honesty	X

HART 2441 Commercial Air Conditioning - Progress & Evaluation Record

(rev. 08/24/2012)

Name _____ ID # _____ Synonym _____ Semester _____

Lesson	Title	Date	Labs	Tests
S	Syllabus			
R	Reading Materials & Lecture Reference			
Reading	Standard 120-97 Electrical and Electronic Diagrams			
Reading	Standard 130 Graphic Electric & Electronic Symbols			
3	Instructional Material & Questions: Burn Outs			
4	Instructional Material & Questions: 5-Ton A/C Split System			
5	Lab Exercise: 5-Ton A/C Split System			
6	10 Minute Section Test # 1			
CD Rom	Split System (Group LCD)			
CD Rom	Motors & Drives - Fundamentals & Selection (Group LCD)			
7	Instructional Material: Wiring a Three Phase Motor			
8	Lab Exercise: Wiring a Three Phase Motor			
9	Instructional Material: 5-Ton A/C with Electric Heat			
10	Lab Exercise: 5-Ton A/C with Electric Heat			
11	Lab Exercise: Economizer Circuitry			
12	Mid-Course Exam			
Reading	Standard 850 Commercial & Industrial Air Filter Equipment			
13	Instructional Material & Questions: 5-Ton Roof Top A/C and Gas Heat			
14	Lab Exercise: 5-Ton Roof Top A/C & Gas Heater			
15	Instructional Material: 10 Ton Carrier Split System A/C			
16	Lab Exercise: 10 Ton Carrier Split System A/C & Gas Heater			
17	Ten Minute Test Section Test # 2			
CD Rom	Motors & Drives - "Maintain & Troublshoot" (Group LCD)			
CD Rom	"Roof Top Units" (Group LCD)			
18	Instructional Material & Quest. Magnetic Starters			
19	Guidelines for Roof Mounted Outdoor A/C Installs			
20	Instructional Material: 20 Ton Roof-Top Unit			
21	Instructional Questions: 20 Ton Roof-Top Unit			
22	Lab Exercise: 20 Ton Roof-Top Unit			
22	Final Exam			
Labs total points =		÷ 7	x	60% =
Section Tests, total points		÷ 2	x	10% =
Mid Term =		÷ 1	x	10%
Final Exam Score =			x	20% =
100-90 = A; 89.9 - 80 = B; 79.9-70 = C; 69.9-60 = D GPA = Grade =				

Instructor's Signature: _____ **Date:** _____