

**AUSTIN COMMUNITY COLLEGE**  
**Heating, Air Conditioning & Refrigeration Technology**  
**HART1401 BASIC ELECTRICITY FOR HVAC**

**Course Syllabus**

(Rev.01/07/2013)

**Course Title:** Basic Electricity for HVAC; 4 semester credit hours

**Course Description:** (introductory level course) principles of electricity as required by HVAC technicians including proper use of test equipment, A/C and D/C circuits, and component theory and operation.

**Textbooks/Materials:** Modern Refrigeration and Air Conditioning ISBN: 1-59070-280-8; store at the riverside ACC bookstore. Course packet sold in the HART Department.

**Tools:** And a good quality digital electrical multimeter is required for testing electrical circuits and components. Since there are many choices and options, your instructor will provide valuable advice before you make this purchase.

**SCANS Competencies:** general academic and workforce skills necessary for entry-level employment for all American workers are the topic of a 1990 report by the Secretary of Labor's Commission on Achieving Necessary Skills (SCANS). Those skills applicable to Electricity Principles are listed here. The State of Texas Higher Education Coordinating Board requires they be included in our curriculum. They are as follows:

<b>1.0 Resources</b>		<b>5.0 Technology</b>	
1.1 Manages Time	X	5.1 Selects Technology	
1.2 Manages Money		5.2 Applies Technology to Task	
1.3 Manages Materials and Facility Resources	X	5.3 Maintains and Troubleshoots Technology	
1.4 Manages Human Resources		<b>6.0 Basic Skills</b>	
<b>2.0 Interpersonal</b>		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		6.5 Listening	X
2.5 Negotiates to Arrive at a Decision		6.6 Speaking	X
2.6 Works with Cultural Diversity	X	<b>7.0 Thinking Skills</b>	
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	X	7.4 Mental Visualization	X
<b>4.0 Systems</b>		7.5 Knowing How to Learn	X
4.1 Understands Systems	X	7.6 Reasoning	X
4.2 Monitors and Corrects Performance	X	<b>8.0 Personal Qualities</b>	
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

Furthermore, the Heating, Air Conditioning and Refrigeration Technology industry has identified certain professional knowledge and skill competencies. Those competencies that are applicable to Electricity Principles are as follows:

- Professional Service-Character Education
- Safety-Personal Safety and Work Practices
- Electrical Safety
- Tools and Equipment-Electrical Testing Devices/Meters
- Basic Electricity
- Electrical Generation and Distribution

**Instructional Methodology:** Electricity Principles is a series of lessons that are computer and textbook based theory learning, and hands-on skills applications. This packet contains the course syllabus, a progress record and all the lessons for this course. For loss protection, your current ACC student I.D. will be required to use CD-ROM's in the classroom or the LRS computer lab. Replacement cost for each title is hundreds of dollars.

**Course Rationale:** electricity principles provides the foundation to support understanding how to troubleshoot heating, air conditioning and refrigeration equipment.

**Learning Outcomes:** the student will exhibit knowledge of basic principles of electricity, electrical current, circuitry, and A/C devices; apply Ohm's law to electrical calculations; perform electrical tests.

**Grading Policy:**

- Grade of A - an average grade of 90% to 100%
- Grade of B - an average grade of 80% to 89.9%
- Grade of C - an average grade of 70% to 79.9%
- Grade of D - an average grade of 60% to 69.9%
- Grade of F - an average grade below 60%

To receive a grade of A, B, C or D, the student must complete all tests.

Improving Your Grade: if a lesson is graded below 70, you may repeat the lesson to improve the grade. Your new grade will be calculated by adding the two scores together and dividing by two. The new grade will not exceed 70. Lessons must be completed for a grade other than 0.

The tests may be multiple choice, true or false, or fill-in-the-blank type questions. Performance of skills may also be required.

- all tests are to be taken during your normal scheduled assigned class times
- all tests are to be administered only by your assigned instructor
- tests are to be turned in at the end of the scheduled class, regardless if it is completed or not
- be sure that you have enough time to complete your tests before starting it

Each test covers the material presented since the previous test. The final exam covers the entire course.

### **Course Policies:**

- the class must be in session when any hands-on work is performed
- students are not to perform hands-on work outside of normal class times
- shop clean up begins at least 10 minutes before end of class. All lab work should stop at that time. A student must clean up spills or mess he creates.
- students must pass (HART1407) welding test before using torches
- students must wear goggles when using grinder, drill, brazing, soldering or working with refrigerant. Safety glasses are an acceptable substitute.

Attendance-you are expected to attend all scheduled meetings. All air conditioning courses meet twice each week, on a Monday-Wednesday schedule or a Tuesday-Thursday schedule. Absences can be made up. 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.

Grade of I (Incomplete)-students 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.

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 may 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.

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.

Name		ID	Synonym	Semester	
Lesson	Title	Date	Labs	Tests	
1	Electricity Can Kill (computer lab)				
2	The Shock Emergency (computer lab)				
3	The Importance of Grounding (computer lab)				
4	Emergency Response (computer lab)				
5	Personal Safety and Work Practices				
6	Section Test: <i>Working Safely with Electricity</i>				
7	Introduction to Multimeters (computer lab)				
8	Continuity and Resistance (computer lab)				
9	Voltage and Current (computer lab)				
10	Section Test: <i>Multimeters Explained</i>				
11	Electron Flow (computer lab)				
12	Symbols, Diagrams and Circuits (computer lab)				
13	Ammeters and Voltmeters (computer lab)				
14	Ohms Law in Action (computer lab)				
15	A Study of Circuits				
16	Electrical Components				
17	Section Test: <i>Basic Electricity: Direct Current</i>				
18	Series Circuits (computer lab)				
19	Series Circuits Analysis (computer lab)				
20	Parallel Circuits (computer lab)				
21	Series/Parallel Circuits (computer lab)				
22	Designing Series Circuits				
23	Designing Parallel Circuits				
24	Designing Series-Parallel Circuits				
25	Section Test: <i>Basic Electricity: DC Circuits</i>				
26	Magnetism and Electromagnetism (computer lab)				
27	Electric Generators and Motors (computer lab)				
28	Measuring AC (computer lab)				
29	Capacitors, Inductors and Transformers (computer lab)				
30	Reactance and Electrical Power (computer lab)				
31	Section Test: <i>Alternating Current Fundamentals</i>				
32	Measuring Resistance				
33	Measuring Current				
34	Measuring Voltage				
35	HVACR Components				
36	Final Exam				
<b>Labs total =</b>		÷ 9	x	50% =	<b>Grade =</b>
<b>Tests total =</b>		÷ 5	x	30% =	<b>100-90 = A; 89.9 - 80 = B; 79.9-70 = C; 69.9-60 =</b>
<b>Final Exam =</b>			x	20% =	<b>Average Score</b>

Instructor's signature \_\_\_\_\_ Date: \_\_\_\_\_