El Paso Community College
Syllabus
Part II
Official Course Description

SUBJECT AREA	**Heating, Ventilation, and Air Conditioning**
COURSE RUBRIC AND NUMBER	**HART 1441**
COURSE TITLE	**Residential Air Conditioning**
COURSE CREDIT HOURS	**4 3 : 3** **Credits Lec Lab**

I. Catalog Description

A study of components, applications, and installation of mechanical air conditioning systems including operating conditions, troubleshooting, repair, and charging of air conditioning systems. Students must pass the 410A and EPA Section 608 Exam with a 70% to be certified. Students may be required to pay a separate fee for the 410A guide and exam. **Prerequisites: HART 1401 and HART 1407. (3:3). Lab fee.**

II. Course Objectives

A. Unit I Air Conditioning General Discussion and Load Characteristics

1. Obtain EPA certification.
2. Obtain 410A certification
3. Determine from the given data which areas of a large building will most likely require heating or cooling.
4. Describe the range of heating and cooling requirements commonly encountered in a large multi-use building.
5. List the three major types of heat loads.

B. Unit II. Residential Cooling Systems

1. Identify the components of residential air conditioners.
2. Describe the processes of the cooling cycle.
3. Install, troubleshoot, and repair residential cooling systems.
4. Service residential cooling systems.
5. Follow manufacturer's installation manual (IOM).
6. Distinguish Variable Refrigerant Volume (VRV) system.

C. **Unit III. Types of Systems**

1. List the five basic types of air conditioning systems and installation.
2. Tell how the most commonly used systems of each type function (list and verify components from vendor of the systems and describe how those parts function in relation to the total system).
3. Explain how each system provides for simultaneous heating and cooling.
4. Install, maintain, and repair evaporative coolers.
5. Itemize and identify evaporative cooler components.

D. **Unit IV. Components of Chilled Water System**

1. Name five major parts of a centrifugal refrigerating machine (also called a chiller) and explain how the parts function.
2. List five major parts of a reciprocating refrigerating machine and explain how the parts function.
3. List eight major components of a large air conditioning system in which chilled water is used for cooling.
4. Explain the functions of each component of the system just described.

E. **Unit V. Control Devices**

1. List the control devices used in several different systems.
2. State the function of each device.

F. **Unit VI. Multi-story Building Air Conditioning**

1. Explain how buildings are divided into zones for heating, ventilation, and air conditioning.
2. List the zones and the air conditioning systems used for each zone for the sample given.

G. **Unit VII Air Conditioning Servicing**

1. Service for seasonal changeover, i.e., clean or change filters, clean condenser and evaporator coils, clean condensate pan, straighten fins, oil or grease bearings, and clean blower wheels.
2. Conduct water analysis on cooling tower and closed loop systems.
3. Identify refrigerants and check for proper refrigerant levels.
4. Check for proper operation of high and low pressure controls.
5. Troubleshoot and repair various types and models of air conditioning systems.
6. Verify overall equipment performance, including proper pipe insulation.
7. Follow maintenance schedule on evaporative coolers, itemize parts, identify parts, and repair.
8. Identify ventilation components.
9. Describe the functioning of each system, the chillers, and the cooling towers.

H. **Unit VIII. Ventilation**

1. Verify if air is toxic or non-toxic.
2. Perform indoor air quality checks.
3. Measure and identify supply/return airflow velocity and volume.
4. Balance intake and exhaust air volume.

I Unit IX Safety

1. Use personal protective equipment.
2. Practice ladder safety.
3. Practice proper handling of pressure vessels.
4. Verify operating high and low limits.
5. Ensure that equipment is properly grounded.
6. Apply proper procedures for handling refrigerants.
7. Check for water leaks.
8. Verify CO levels.

J. **Unit XII. Other Professional Skills**

1. Demonstrate safe driving skills.
2. Avoid damaging customer's property.
3. Demonstrate courteous behavior.
4. Display professional appearance, apply multi-tasking skills, and perform proper housekeeping during and after job.
5. Resolve customer's complaint in a tactful manner.

6. Provide initial courtesy call, forecast arrival of parts or equipment for the job, and follow up with a courtesy call.
7. Maintain eye contact with customer and introduce yourself appropriately.
8. Demonstrate proper body language and empathy for the customers' situation.
9. Organize and inventory service vehicle.
10. Document problem accurately by writing legible reports and compile warranty information.

III. THECB Learning Outcomes (WECM)

1. Identify various types of system applications.
2. Perform charging, recovery, and evacuation procedures of an installed system.
3. Perform component and part diagnostics and replacement.
4. Perform system maintenance.

IV. Evaluation

A. Challenge Exam
Students who wish to challenge the course should contact the Testing Center and the Division Dean. Challenges must be accomplished before the census cut-off date. Students who previously have received a W or a letter grade for the course are not eligible to challenge the course.

B. Homework Assignments and Quizzes
Students are required to turn in review questions at the end of each unit of the textbook, upon completion of that unit. The students will be given two quizzes; these grades will constitute 30% of the final grade.

C. Lab Assignments
Will constitute 40% of final grade

D. Final Exam
Will constitute 30% of final grade

E. Grading Scale:
I = Incomplete
W = Withdrew or Withdrawn

90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

V. Disability Statement (Americans with Disabilities Act [ADA])

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC Rm M-54 (831-8815); and MDP Rm A-125 (831-7024).

VI. 6 Drop Rule

Students who began attending Texas public institutions of higher education for the first time during the Fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult

with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counseling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.

VII. Title IX and Sex Discrimination

Title 9 (20 U.S.C. 1681 & 34 C.F.R. Part 106) states the following "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving Federal financial assistance." The Violence Against Women Act (VAWA) prohibits stalking, date violence, sexual violence, and domestic violence for all students, employees and visitors (male and female). If you have any concerns related to discrimination, harassment, or assault (of any type) you can contact the Assistant to the Vice President for Student and Enrollment Services at 915-831-2655. Employees can call the Manager of Employee Relations at 915-831-6458. Reports of sexual assault/violence may also be reported to EPCC Police at 915-831-2200.