



## Course Syllabus

DEMR 1323 Heating, Ventilation and Air  
Conditioning Troubleshooting & Repair

Automotive Technology Training Center

Class 60010 - Term Summer 2015

Houston Community College System NE

Instructor: Mr. Gary Nagelhout

Jun 8, 2015 to Aug 2, 2015

Class Monday – Thursday  
10:00 am to 1:00 pm

OFFICE HOURS: 1:30 PM to 2:30 PM

Office Room Number 206

Tel. 713 718 8114

Today's automotive repair technician has a monumental challenge before him or her to keep abreast of the constantly changing technical advances in the heavy vehicle & automotive industry. The technician has to comprehend information on the new Hi-Tech electrical systems, the ever- changing mechanical technology and improved materials, which make up a modern day vehicle. The technician has to determine what component part or parts are performing incorrectly by using meters, gauges, and computer test equipment. The technician will need to be able to repair the customer's vehicle as quickly as possible. Repair technicians are very desirable employees in the current and future workplace. They command high salaries for their expertise of diagnosis and repair of the vehicle.

**COURSE DESCRIPTION:** A study of the Heating and Air Conditioning System. How it works, how to diagnose problems and how to repair problems. Correct refrigerant recovery, recycling, and handling procedures.

**COURSE OBJECTIVES:**

Upon completion of this course, the student shall have demonstrated competencies in the ability to:

1. Visually inspect a heating and air conditioning system and locate obvious troubles.
2. Diagnose common heating and air conditioning problems.
3. Locate air conditioning and heating system leaks.
4. Perform general repair procedures on the heating and air conditioning system including:
  - A. Charging the air conditioning system
  - B. Recovering and recycling refrigerant
  - C. Evacuating the air conditioning system
  - D. Removing and replacing heating and air conditioning system components
5. Demonstrate safe working practices when servicing heating and air conditioning systems.
6. Correctly answer ASE certification test questions about the diagnosis and repair of heating and air conditioning systems.
7. Complete Scans Skills C-8, C-9, and C-10 with a score of 70% or better.

**SCANS SKILLS**

For an explanation of exactly what Scans Skills are, see the URL <http://wdr.doleta.gov/SCANS/>

C-8 **Exercises Leadership**: Communicates Thoughts, feelings, and ideas to justify a position, encourages, persuades, convinces, or otherwise motivates an individual or groups; including responsibly challenging existing procedures, policies, or authority.

C-8 Exercises Leadership: Using a service manual or a repair database, students will role play an unhappy automotive service customer and an automobile service technician. The service customer will be especially upset by the dollar amount of a repair order for a particular service or repair. The repair technician must justify the dollar amount of the repair to the customer. This exercise must be completed to a score of 70% or better.

#### C-8 Exercises Leadership – Evaluation

Convinces the customer the repair or service procedure was necessary \_\_\_\_\_ 30%  
Convinces the customer the dollar amount of the repair was justified \_\_\_\_\_ 30%

Convinces the customer that he or she was better off by having the repair or service performed before the vehicle left him or her stranded or led to additional costly repairs \_\_\_\_\_ 40%

C-9 **Negotiates**: Works toward an agreement that may involve exchanging specific resources or resolving divergent interests.

C-9 Negotiates: Using a service manual or a repair database, students will role play two technicians discussing the best way to diagnose two different, but especially tough vehicle problems. The boss puts his two best technicians on the job because the vehicle has been in the shop for 3 weeks, and no one else has been able to diagnose the problems. Both technicians have different opinions on how to approach the diagnosis, but agree to work together to diagnose the vehicle so the vehicle can be repaired quickly to Satisfy the customer, and show the boss they can work together. This exercise must be completed to a score of 70% or better.

#### C-9 Negotiates – Evaluation

Both technicians agree on the best method of diagnosis \_\_\_\_\_ 30%

Both technicians use a logical approach of diagnosis by using the service manual or repair database \_\_\_\_\_ 40%

Both technicians and the boss are satisfied the approach they plan will lead to a satisfactory repair and a satisfied customer \_\_\_\_\_ 40%

C-10 **Works with Cultural Diversity**: Works well with men and women and with a variety of ethnic, social, or educational backgrounds.

C-10 Works with Cultural Diversity: Students will discuss working with people of different backgrounds. Students can either relate experiences they have had with the class, or role play to understand differences.

#### C-10 Works with Cultural Diversity -Evaluation

Students adequately explain differences \_\_\_\_\_40%

Students offer insight on dealing with people different than themselves \_\_\_\_\_40%

**TIME AND DAYS OF THE COURSE;** Classes are held Monday through Thursday 10AM to 1PM. There will be a scheduled shop clean up every day at the end of class.

**ATTENDANCE/ABSENCES/TARDY;** The College System believes that regular attendance in all classes is necessary and makes no distinction between excused and unexcused absences. These policies are covered in detail in the HCCS catalog. Students are expected to read and understand these policies.

1. **EXCESSIVE ABSENCES;** although it is the responsibility of the student to drop a course for nonattendance, the instructor has full authority to drop a student. Students who continue attending class after the official withdrawal date has passed are not eligible to be withdrawn by the instructor. These students must be assigned a grade on the final grade sheet.

2. **ADMINISTRATIVE WITHDRAWALS;** THREE CREDIT-HOUR LECTURE/LAB CLASS. Students may be dropped after more than 12 hours of absence are accumulated or 2 days.

#### **SAFETY GLASSES**

**All A.T.T.C. students must wear OSHA approved safety glasses or safety goggles any time they are working in shop.**

**STUDENT I.D. BADGES:** Students must wear their I.D. badges 100% of the time while on campus. Students who do not have their I.D. badges will not be allowed to check out tools, or use LRC. Without all the proper tools, students cannot work in the shop and will receive a **grade of "F"** for shop grade for the day, or **-4 point off from the daily participation grade.**

#### **MAKE-UP POLICY**

Under limited circumstances students will be allowed to make up work missed due to absence or tardy. Make-up work will be up to the discretion of the instructor. **All make up work must be completed before last day of the following weekly Test.**

## **STUDENTS WITH SPECIAL NEEDS**

Several special services are available to you at Automotive Technology Training Center. One service is full-time, professional counseling. If, like many students, you have either math or reading difficulties, a special course can be made available.

## **REQUIRED TEXTBOOK Sean**

**Bennett:** Heavy Duty Truck Systems,  
5<sup>th</sup> Edition

## **REQUIRED WORKBOOK – Binder for Lab Sheets**

## **COURSE OUTLINE:**

### **Week 1, 2**

#### **I – Course Introduction**

- A. Purpose and scope to the course
- B. Course Attendance
- C. Student Participation
- D. Review of Course Assignments
- E. Grading
- F. Safety

**Read Chapter 35 – Heating, Ventilation and Air Conditioning  
Fundamentals Complete Lab Activities – Classroom**

#### **Lecture/Lab**

- IML Unit I – Principles of Air Conditioning**
- IML Unit II – Air Conditioning System Design**
- IML Unit III – Equipment and Refrigerants for Automotive Air Conditioning System Service**

### **Week 3, 4 Weekly Test -- Notebook Check**

**Read Chapter 35 – Heating and Air Conditioning Service  
Complete Lab Activities -- Classroom**

- Lecture/Lab IML Unit X – Diagnosing and Repairing Automotive Heating and Air Conditioning IML Unit IV – Servicing the Automotive Air Conditioning System IML Unit V – The Automotive Air Conditioning Compressor and Compressor Clutch**

## **Week 5, 6 Weekly Test -- Notebook Check**

**Lecture/Lab IML Unit VI** --The Automotive Air Conditioning Condenser, Receiver-Drier, Thermal

Expansion Valve, and Evaporator **IML Unit VII** – Electrical Components of Automotive Air Conditioning Systems **IML Unit VIII** – The Automotive Heating System and Engine Cooling System

## **Week 7, 8 Weekly Test**

**Lecture/Lab** --Repairing the Automotive Heating and Engine Cooling System  
--Diagnosing Automatic and Semi-Automatic Heating and Cooling Control

Systems Roof Mount – Air Conditioning Systems & Retro-fits

## **Final Exam**

### **COURSE EVALUATION:**

A minimum of four exams and one final exam will be given. Students will be assigned a minimum of two workbook chapters to complete. Students must demonstrate proficiency on the ASE task list for heating and air conditioning. Student's grades will be calculated as follows:

Test Average 20%    Final Exam 15%    ASE task list 50%  
Class Participation 15%

Total 100%

GRADES: 90 to 100 = A  
80 to 89 = B  
70 to 79 = C  
60 to 69 = D  
59 & Below = F

Failure to take the Final Exam will result in a final grade of F

### **CLASS PARTICIPATION:**

This grade is based upon the student's willingness to participate in class, lab, LRC, and in the shop. Participation in the shop requires the student to bring his tools. Students unwilling or unable to participate will have points deducted from shop, lab, participation and module section of their score.

## Shop Safety Rules

1. Eye protection must be worn in the shop
2. When a vehicle is jacked up with a floor jack, jack stands must be used to support the vehicle. The vehicle must be fully supported before any work is done.
3. When starting a vehicle, the person starting the vehicle **MUST** be sitting in the driver's seat
4. Horseplay will not be tolerated in the shop
5. All spills should be cleaned up promptly. Never allow spills to remain on the floor.
6. Report all accidents to your instructor immediately—even minor accidents
7. Work clothes should be relatively clean and free of all flammable grease or oil
8. Make sure all fuel lines and linkages are connected before cranking an engine. Never prime an engine while cranking.
9. If you make a mess—clean it up.
10. After using any drain pan, empty the pan in an appropriate waste storage container, and clean the drain pan.
11. Hydraulic lifts are to be left fully up or fully down over night. If left up, safety stands should be in place.
12. Never leave a creeper on the floor. When not in use—put them away
13. Do not use any tool or piece of equipment that you believe to be unsafe. Report it to your instructor.
14. Before starting an engine in the shop, connect an exhaust hose to the tail pipe.
15. Always use goggles or a face shield when grinding, hammering, machining, working under a car, or blowing with shop air.
16. If foreign materials become lodged in the eye, don't rub it. This can cause the particle to scratch the eyes and/or become embedded deeper. Notify your instructor immediately!
17. Don't work when feeling sick. Inform your instructor of the circumstances.
18. Report unsafe or improper practices to your instructor
19. Never leave gasoline in open containers.
20. If you are uncertain about positioning a vehicle on a lift or jack—consult your instructor.
21. An instructor must supervise welding or cutting.
22. No loud radios in the shop.
23. Long hair must be confined (under a hat, tied back, or a hair net)
24. Do not wear loose fitting or flowing clothing that could become entangled in rotating machinery.
25. Material safety data sheets are located in the tool room.
26. Rings, watches, bracelets, earrings and other jewelry should not be worn in the shop.
27. If you break a tool please inform your instructor or the tool room personnel.
28. If a tool or piece of equipment is not working properly please inform your instructor or the tool room personnel.

## BLOCK INSTRUCTION

All classes will be taught in blocks each lasting four weeks. Thus the student will attend six hours per day in one class for a period of four weeks. At the end of the four weeks the student will have completed one of the classes for which he or she is enrolled. The student will then begin the second of the for which they have enrolled. This will continue for a 16 week period or until all classes have been covered.

## **DISABILITY**

Any student with a documented disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) Who needs to arrange reasonable accommodations must contact the Disability Services Office at the respective college at the beginning of each semester. Faculties are authorized to provide only the accommodations requested by the Disability Support Office. If you have any questions Please contact 713-718-5165.

## **REQUIREMENTS FOR THE SUCCESSFUL COMPLETION OF AUMT 1345**

1. Have a passing average
2. Take the final exam
3. Complete all items on the assignment sheet.

ATTENTION STUDENT:

### **EGLS<sub>3</sub>-- Evaluation for Greater Learning Student Survey System**

At Houston Community College, professors believe that thoughtful student feedback is necessary to improve teaching and learning. During a designated time, you will be asked to answer a short online survey of research-based questions related to instruction. The anonymous results of the survey will be made available to your professors and division chairs for continual improvement of instruction. Look for the survey as part of the Houston Community College Student System online near the end of the term.

All students,

I HAVE READ & UNDERSTAND THE CONTENTS OF THIS DOCUMENT AS IT RELATES TO AUMT 1305. I WILL ABIDE BY THE GUIDELINES SET FORTH BY THE SYLLABUS.

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Signature

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Print

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Date