

Course Title: AUMT 1345-344 Automotive Climate Control Systems Pearson Link

Semester/Year: Spring 2023

Instructor: Mr. Andy Homan

Office/Location: Lubbock Center 3907 Ave. Q, Lubbock, TX. 79412 Office# 136B

Phone/E-mail: 541-519-5382 ahoman@southplainscollege.edu

Office Hours: Check posted hours after classes begin or by appointment.

SOUTH PLAINS COLLEGE IMPROVES EACH STUDENTS LIFE

If you are experiencing any of the following symptoms, please do not attend class and either seek medical attention or get tested for COVID-19.

Cough, shortness of breath, difficulty breathing

Fever or chills

Muscles or body aches

Vomiting or diarrhea

New loss of taste and smell

Please also notify DeEtte Edens, BSN, RN, Associate Director of Health & Wellness, at

dedens@southplainscollege.edu or 806-716-2376.

I. GENERAL COURSE INFORMATION

Course Description: (3:2:4) – Prerequisite: AUMT 1407 or consent of the instructor. This course covers the theory of automotive air conditioning and heating systems. Emphasis will be on the basic refrigeration cycle and diagnosis and repair of system malfunctions. Topics also cover EPA guidelines for refrigerant handling and new refrigerant replacements. This course may be taught manufacturer specific.

Course Goals/Objectives Utilizing safety procedures, the student will explain the operation of the basic refrigeration cycle; diagnose and repair air distribution systems; demonstrate proper procedures for handling refrigerant; and describe the operation of air conditioning and heating controls.

Course Competencies: A = 100-90 B = 89-80 C = 79-70 F = 69 - or below

A grade of a C or higher is required in AUMT 1345 in order to successfully complete this course. Academic Integrity. It is the aim of the faculty of South Plains College to foster a spirit of complete honesty and a high standard of integrity. The attempt of any student to present as his own, any work which he has not honestly performed, is regarded by the faculty and administration as a most serious offense and renders the offender liable to serious consequences, possibly suspension. For further information concerning Cheating and Plagiarism, read the section on Academic Integrity in the SPC General Catalog. If you have a question as to whether you may work with other students on any assignment, ASK YOUR INSTRUCTOR. On some assignments working with others is encouraged.

SCANS and Foundation Skills. Specific SCANS competencies and foundation skills applicable to this course are listed adjacent to each objective in the course objective table. They include: Foundation Skills (F): 1,2,3,4,5,6,8,9,10,11,12. Competencies (C): 5,6,7,15,16,18,19,20. A complete list of SCANS competencies and foundation skills is attached at the end of this syllabus.

Verification of Workplace Competencies-Technical Education Division. The learning outcomes of this course will prepare the student to meet the competencies measured in a comprehensive elective course experience (Course #s AUMT 1366, AUMT 2366). In addition the student will also be prepared to take the ASE Student Certification test for Heating and AC.

II SPECIFIC COURSE/INSTRUCTOR REQUIREMENTS

A. Textbook & Other Required Materials:

1. Halderman James D. Automotive Technology, Principles, Diagnosis, and Service. 6th Edition, Pearson Publishers, Copyright 2020 (with on-line curriculum)

2. Pen or pencil, and notebook for note taking and assignments

3. Safety Glasses, and Hearing Protection sufficient for course length. Class Attendance Policy. Students are expected to attend all classes in order to be successful in a course. The student may be administratively withdrawn from the course and any concuurent course when absences become excessive without notice. Attendance is worth 20 % of your grade. Leaving class without notifying your instructor is considered an absence, regardless of the time you left.

When an unavoidable reason for class absence arises, such as illness, an official trip authorized by the college or an official activity, the instructor may permit the student to make up work missed. It is the student's responsibility to complete work missed within a reasonable period of time as determined by the instructor. Students are officially enrolled in all courses for which they pay tuition and fees at the time of registration. Should a student, for any reason, delay in reporting to a class after official enrollment, absences will be attributed to the student from the first class meeting.

Students who enroll in a course but have "Never Attended" by the official census date, as reported by the faculty member, will be administratively dropped by the Office of Admissions and Records. A student who does not meet the attendance requirements of a class as stated in the course syllabus and does not officially withdraw from that course by the official census date of the semester, may be administratively withdrawn from that course and receive a grade of "X" or "F" as determined by the instructor.

It is the student's responsibility to verify administrative drops for excessive absences through MySPC using his or her student online account. If it is determined that a student is awarded financial aid for a class or classes in which the student never attended or participated, the financial aid award will be adjusted in accordance with the classes in which the student did attend/participate and the student will owe any balance resulting from the adjustment.

Assignment Policy: All assignments are due at the beginning of class on the due date unless otherwise stated by your instructor. . Part of these assignments will be on-line through the on-

line curriculum, you should log on to the on-line curriculum at the beginning of the semester in order to complete them on time. There may be no makeup assignments and no late assignments will be accepted. The dates printed in this syllabus can change. Every effort will be made to inform students of those changes, but the students are ultimately responsible for all assignments regardless of any changed dates. Please check the dates with your instructor throughout the course.

D. Grading Policy/ Procedure and/or Methods of Evaluation: All exams are mandatory for effective student evaluation. Exams will cover theory and practical skills pertaining to all aspects of material presented. Adequate study time should be set aside for exam reviews. There may be no makeup exams. All fees owed to South Plains College, including projects, are required to be paid in full before you take your final exam. The ASE Student Certification test mentioned above can be used in place of your final exam.

You will be evaluated during this course by the following method:

Unit exams, Written assignments, pop quizzes = 25%

Skills tests/ Lab sheets = 50%

Final Exam: = 25%

A unit skills test is a measure of how well you follow instructions, your safety in the shop, your use of tools, your cleanliness in the work area and your attention to detail while you perform diagnostics or repairs within a required time period. . If you're late for a skills test the following will happen; 0 to 5 minutes late = -10pts; more than 5 min. but less than 10 min. late = -20pts; more than 10 min. but less than 15 min.late = -30pts. If you are more than 15 minutes late your will have earned a "0" for the test.

A task sheet is used to plan and track students while they perform required skills in the shop. This is not used to average your grade, but it is a professional evaluation of how well you work independently and your level of expertise in completing assigned tasks. Prospective employers will want to see this during an interview, so please follow the shop and repair procedures to the best of your ability.

E.

Special Requirements: A student's conduct is expected to follow the guidelines stated in the college catalogue and student handbook, any deviation will result in immediate disciplinary action. Please turn off all cell phones, pagers, etc. during class. A detailed list of lab/shop guidelines will be distributed to you at the beginning of this class; you are expected to follow all guidelines when in the shop. No smoking is permitted in the building or outside the back doors of the shop and food and drinks are not allowed in any classroom, lab, or shop. All these activities will be limited to break time in designated areas only. Breaks will be limited to 20 minutes. Do not park on the back lot unless preauthorized by your instructor, unauthorized vehicles can be towed at the owner's expense.

Dress Code: The Automotive Program requires you to dress appropriately. Flip flops or opened toed shoes are not allowed in the shop, proper foot attire should be worn to protect your feet, leather work boots are recommended. Jeans/ pants will be worn so that neither one falls to your thighs or knees, belts

must hold them at your waistline. Safety glasses will be worn at all times in the shop. If a student fails to comply with the above dress code, he or she will be sent home and given an absence for that day.

FOOD AND DRINK IN CLASSROOMS

It is the policy of South Plains College not to permit food or drink in the classrooms or laboratories.

In case of emergency, contact the following numbers, but DO NOT leave a voice mail message. 716-4677 – Lubbock Center 716-2923 – Reese Center (mobile 893-5705)

LUBBOCK CAMPUS GUIDELINES

CHILDREN ON CAMPUS

Many of the students attending classes at South Plains College - Lubbock Camps are also parents who value the opportunity to participate in higher education. Sometimes students are faced with the decision of whether to remain at home with their children, bring children with them to class, or be absent from class. The following guidelines address concerns for the safety of children on campus and provide for an environment conducive to learning.

CHILDREN IN THE CLASSROOM

Students are not allowed to bring children to class and will be asked to leave in the interest of providing an environment conducive for all students enrolled in the class. Students are responsible for adherence to the attendance requirements set forth by the instructor in the course syllabus.

UNATTENDED CHILDREN ON CAMPUS

Children may not be left unattended. In order to provide for the safety of children on campus, parents or other guardians are responsible for supervising children while utilizing services or conducting business on campus.

DISRUPTIVE CHILDREN

Disruptive children will not be allowed to interfere with college business. Parents or other guardians are responsible for supervising and controlling the behavior of children they have brought on campus.

Diversity Statement

In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be. Americans with Disabilities Act Statement

Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Disability Services Office. For more information, call or visit the Disability Services Office at Levelland Student Health & Wellness Center 806-716-2577, Reese Center (also covers ATC) Building 8: 806-716-4675, Plainview Center Main Office: 806-716-4302 or 806-296-9611, or the Health and Wellness main number at 806-716-2529.

GENERAL SAFETY ON CAMPUS

South Plains College recognizes the importance of safety on campus. The protection of persons and property is a responsibility, which we all share. Personal safety begins with the individual. The following guidelines are intended to assist you in protecting yourself and to encourage practices that contribute to a safe environment for our campus community. Never leave your personal property unsecured or unattended.

Look around and be aware of your surroundings when you enter and exit a building.

Whenever possible, avoid walking alone, particularly after dark. Walk to your vehicle with other class members or request that the Security Guard walk you to your car.

When approaching your vehicle, keep your keys in your hand; look under your car and in the back seat and floorboard. Lock the doors as soon as you are inside your car.

COURSE OBJECTIVES

Unit 1: Fundamental Principles of Heating & Air Conditioning Upon completion of this unit, students will be able to:

Explain the basic laws of heat and the three methods of heat transfer.

Define the term latent heat and discuss the difference between latent and sensible heat.

Describe the difference between heat and temperature and how heat is measured.

Explain the body's reaction to heat and humidity.

Discuss the relationships between temperature and pressure concerning a liquid. (Closed System)

Discuss the relationships between temperature and pressure concerning a gas. (Closed System)

Discuss the difference between pressure and vacuum.

Research applicable vehicle and service information, such as heating and A/C system operation, vehicle service history, service precautions, and TSB's.

Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).

COURSE OBJECTIVES

Unit 2: Cooling and Heating System Servicing Upon completion of this unit, students will be able to:

Determine coolant condition and coolant type for vehicle application; drain and recover coolant.

Inspect engine/heater hoses and belts; perform necessary action.

Perform cooling system, cap, and recovery system tests.

(Includes pressure, CO, and temperature.); determine necessary action. Inspect, test, and replace thermostat assembly.

Flush system; refill system with recommended coolant; bleed system

Inspect and test cooling fan assembly fan shroud, and air dams; perform necessary action.

Inspect, test heater control valve(s); perform necessary action.

Diagnose passenger compartment temperature control problems.

Inspect and test an electric engine cooling fan, fan control system and circuits; determine necessary action.



COURSE OBJECTIVES

Unit 3: Electrical and Vacuum Passenger Compartment Air Flow Servicing .Upon completion of this unit, students will be able to:

Diagnose malfunctions in the electrical controls of heating ventilation, and A/C systems; determine necessary action.

Diagnose malfunctions in the vacuum and mechanical components and controls of the heating ventilation A/C system; determine necessary action.

Inspect and test A/C-heater control panel assembly; determine necessary action.

Inspect and test A/C-heater control cables and linkages; perform necessary action.

Inspect and test A/C heater blower assembly and electrical components; perform necessary action.

Test and diagnose A/C compressor clutch control systems; determine necessary action.

Inspect, test, and repair A/C-heater air distribution devices.

Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.

COURSE OBJECTIVES

Unit 4: System Components and Function, Equipment, Evacuation, Recycle, Recharge, and Leak Detection Upon completion of this unit, students will be able to:

Discuss safety habits concerning the A/C system, including recycling.

List the required properties of a refrigerant.

Trace the refrigerant flow through an A/C system.

Identify and discuss the function of the accumulator, receiver dryer, condenser, orifice tube, expansion valve, and evaporator.

Describe how a Schrader valve operates.

Name the positions of a three-position service valve.

Describe the high and low gauges and their differences.

Properly attach a manifold gauge set to a vehicle.

Explain the necessity of evacuating an A/C system.

Describe and perform the evacuation and discharge processes.

Describe how to flush a contaminated system.

List the different steps involved when charging an A/C system. Including Hybrid systems.

Describe a charging station and know how to use one.

Partially charge an A/C system.

Perform oil check or injecting oil. Includes Hybrid Compressor

Name the four methods of leak detection and the process for each method.

Describe signs to look for when leak testing.

Explain why refrigerant can leak slowly and not be apparent when tested for leaks.

Describe how to read air conditioning gauges and demonstrate the proper method for installing a gauge set on an A/C system.

COURSE OBJECTIVES

Unit 5: Air Conditioner System Service, Diagnosis and Retrofitting.

Upon completion of this unit, students will be able to:

Discuss and demonstrate various methods of checking compressor oil. Including Hybrid compressors.
Identify the properties of refrigerant oil.
Identify various types of compressors. Including Hybrid vehicles.
Remove a compressor head and determine the condition of the valves.
Describe and demonstrate how to replace the compressor seal on at least two different types of compressors.
Determine the condition of the compressor clutch and demonstrate how to check belt tension. Includes Hybrid systems
Inspect compressor pulley bearing condition and demonstrate the procedure for replacing faulty bearings.
Demonstrate how to remove an orifice tube.
Test a thermostatic expansion valve temperature-sensing bulb.
Locate the evaporator condensation drain and discuss how to clear any obstructions.
Identify various types of mufflers.
Inspect, test, and repair A/C controlled engine idle system.
Performances test at least two A/C systems.
Diagnose A/C system problems indicated by the sight glass.
Diagnose A/C system problems indicated by pressure gauge readings.
Diagnose A/C system problems indicated by visual and touch procedures.
Diagnose A/C system pressure control problems.
Diagnose A/C system high-pressure problems.
Inspect, test, repair, and adjust an A/C compressor cut-off system.
Explain why a sudden temperature change can indicate a blocked area.
Flush A/C system; determine need for an additional filter; perform necessary action.
Discuss the proper procedures to retrofit a R-12 system to R134a.

COURSE OBJECTIVES

Unit 6: Automatic and Semi-Automatic Systems Diagnosis Repair.

Upon completion of this unit, students will be able to:

Check the operation of automatic and semi-automatic heating, ventilation, and A/C control systems; determine necessary action. Includes Hybrid systems.
Inspect, test, and replace ambient air sensor.
Inspect, test, and replace power servo.
Inspect, test, and replace automatic temperature control panel.

AUMT 1345 Auto. Climate Control Systems

Assignments and Test Schedule

Log on to this course on Blackboard using your SPC credentials, also log on to the on-line curriculum using your purchased access from the bookstore and course ID # provided by your instructor. Become familiar with the website and look for all on line assignments. It is your responsibility to keep up with all assignments and turn in by the due dates listed below and on line.

Unit 1: Fundamental Principles of Heating & Air Conditioning, - January 17th – January 27th

Unit I Assignment: In your textbook / on-line , read Chapter 13, particularly pages 117 to 119 and Chapter 63, be prepared to discuss this material in class or in the shop. Complete the on – line assignments for chapter 63 and turn in on the due date. Other written and in-class assignments will be assigned throughout the unit, maybe even on-line.

Unit I Homework Due Date: (in Pearson) January 26th

Unit I Skills Exam January 27th

Unit I Written Exam (in Blackboard) January 27th

Unit 2: Cooling and Heating System Servicing, - January 30th– February 17th

Read Chapters 20 & 21 and be prepared to discuss this material in class or in the shop. Complete the on – line assignments for chapters 20 & 21 and turn in on the due date. Other written and in-class assignments will be assigned throughout the unit, maybe even on-line.

Unit II Homework (in Pearson) Due Date February 16th

Unit II Skills Exam February 17th

Unit II Written Exam (in Blackboard) February 17th

Unit 3: Electrical and Vacuum Compartment Air Flow Servicing-February 20th – March 3rd Read Chapter 64 and be prepared to discuss this material in class or in the shop. Complete the on – line assignments for chapter 64 and turn in on the due date. Other written and in-class assignments will be assigned throughout the unit, maybe even on-line.

Unit III Homework (in Pearson) Due Date: March 3rd

Unit III Skills Exam: March 3rd

Unit III Written Exam: (in Blackboard) March 3rd SPRING BREAK MARCH 13th – 17th

Unit 4: System Components and Function, Equipment, Evacuation, Recycle Recharge and Leak

Detection, - March 6 th – March 31st

Read Chapters 66 & 67 and be prepared to discuss this material in class or in the shop. Complete the on – line assignments for chapters 66 and turn in on the due date. Other written and in-class assignments will be assigned throughout the unit, maybe even on-line.

Unit IV Homework Due Date: (in Pearson) March 30th

Unit IV Skills Exam March 31st

Unit IV Written Exam (in Blackboard) March 31st Easter Holiday April 10th

Unit 5: Air Conditioner System Service, Diagnosis and Retrofitting April 3rd – April 28th

Read Chapter 67 and be prepared to discuss this material in class or in the shop. Complete the on – line assignments for chapter 67 and turn in on the due date. Other written and in-class assignments will be assigned throughout the unit, maybe even on-line.

Unit V Homework Due Date: April 27th

Unit V Skills Test: April 28th

Unit V Written Exam: April 28th

Unit 6: Automatic Systems Diagnosis & Repair To be included in Unit 5

Unit VI Assignment: Read Ch. 65 and review All Hybrid Heating and Air-Conditioning from the previous chapters and be prepared to discuss this material during class and perform all assigned projects.

This material is testable!!! All shop projects must be completed.

Final Exam – MAY 9th