

COURSE PREFIX /NO:           **AUT 241**  
COURSE TITLE:               **AUTOMOTIVE AIR CONDITIONING**  
LEC HRS/WEEK:               **2.0**  
LAB HRS/WEEK:               **6.0**  
CREDIT HRS/SEMESTER:       **4.0**

[DL ATTENDANCE/VA STATEMENT](#)  
[TEXTBOOK INFORMATION](#)

### **COURSE DESCRIPTION**

This course covers is a study in the principles of refrigeration, operation, and testing procedures to determine the cause of malfunctions, servicing, or repairing by approved methods. Emphasis is on special tools, equipment, and safety procedures.

### **COURSE COMPETENCIES**

Upon successful completion of this course, the student should be competent to perform the following tasks:

#### **Module 1. A/C System Diagnosis and Repair**

1. Identify and interpret heating and air conditioning concerns; determine necessary action.
2. Research applicable vehicle service information, such as heating and air conditioning operation, vehicle service history, service precautions, and technical service bulletins.
3. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).
4. Performance test A/C system; diagnosis A/C system malfunctions using principals of refrigeration.
5. Diagnose unusual operating noises in the A/C system; determine necessary action.
6. Identify refrigerant type; conduct a performance test of the A/C system; determine necessary action.
7. Leak test A/C system; determine necessary action.
8. Inspect the condition of discharged oil; determine necessary action.
9. Determine recommended oil for system application.

## **Module 2. Refrigeration System Component Diagnosis and Repair**

### **Compressor and Clutch**

1. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
2. Inspect A/C compressor drive belts; replace and adjust as needed.
3. Inspect, test, and replace A/C compressor clutch components or assembly.
4. Remove and reinstall A/C compressor and mountings; measure oil quantity; determine necessary action.

## **Module 3. Evaporator, Condenser, and Related Components**

1. Determine need for A/C system filter; perform necessary action.
2. Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action
3. Inspect A/C condenser for airflow restrictions; perform necessary action.
4. Remove and reinstall receiver/drier or accumulator/drier; measure oil quantity; determine necessary action.
5. Remove and install expansion valve or orifice (expansion) tube.
6. Inspect evaporator housing water drain; perform necessary action.
7. Remove and reinstall evaporator; measure oil quantity; determine necessary action.
8. Remove and reinstall condenser; measure oil quantity; determine necessary action.

## **Module 4. Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair**

1. Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
2. Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.

3. Inspect engine cooling and heater system hoses and belts; perform necessary action.
4. Inspect, test, and replace thermostat and housing.
5. Determine coolant condition and coolant type for vehicle application; drain and recover coolant.
6. Flush system; refill system with recommended coolant; bleed system.
7. Inspect and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action.
8. Inspect and test electrical fan control system and circuits.
9. Inspect and test heater control valve(s); perform necessary action.
10. Remove and reinstall heater core.

#### **Module 5. Operating Systems and Related Controls Diagnosis and Repair**

1. Diagnose failures in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action.
2. Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.
3. Test and diagnosis A/C compressor clutch control systems; determine necessary action.
4. Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.
5. Inspect and test A/C-heater control panel assembly; determine necessary action.
6. Inspect and test A/C-heater control cables and linkages; perform necessary action.
7. Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action.
8. Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

## **Module 6. Refrigerant Recovery, Recycling, and Handling**

1. Verify correct operation and maintenance of refrigerant handling equipment.
2. Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.
3. Recycle refrigerant.
4. Label and store refrigerant.
5. Test recycled refrigerant for non-condensable gases.
6. Evacuate and charge A/C system.

### **COURSE REQUIREMENTS**

Students are responsible for attaining competencies through completion of the following course requirements:

### **ATTENDANCE**

Students will be bound by the policies stated in the York Technical College Student Handbook. Students must attend 80% of the hours assigned the class for a semester to receive credit for the course. In case a student does miss a class, the student is responsible for obtaining the material that was covered during the absence. If a student is aware that a class will be missed, then the student should notify the instructor at the earliest possible date. Students with unexcused absences during tests will be allowed to make up tests at the discretion of the instructor. The student has the burden to be sure that some arrangement has been made with the instructor for taking a make-up test.

### **ACADEMIC HONESTY**

York Technical College adheres to the South Carolina Tech Student code, approved by the State Board for Technical and Comprehensive Education on March 13, 1974(revised last April, 25 1984). Copies of this code are available in the Library and from Student Services. Any student involved in cheating or any other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action. See the student handbook section “Student Life” subheading “Student Conduct” for further details.

## **PARTICIPATION IN CLASS**

Students will be expected to participate in class discussions, to demonstrate problem-solving techniques, to complete tests, homework, lab experiments, lab reports and other assigned work.

## **EVALUATION STRATEGIES / GRADING**

The grading scale will be as follows:

Grade Points	
A	90-100
B	80-89
C	70-79
D	60-69
F	00-59

### **Evaluation Method**

Tests may be written or oral and may contain questions that are true or false, short answer, multiple choice, fill in the blank and/or problems. Students should refer to the instructor for the number of tests to be given and the material to be covered on each test. Each test will be of equal weight unless otherwise indicated by the instructor. Lab grades will be based on the completion of the Course Competencies, team work, safety, class participation, and housekeeping.

Final grades will be determined as follows:

Module 1	Tests	6.67%
Module 1	Lab	13.33%
Module 2	Tests	6.67%
Module 2	Lab	13.33%
Module 3	Tests	6.67%
Module 3	Lab	13.33%
Module 4	Tests	6.67%
Module 4	Lab	13.33%
Module 5	Tests	6.67%
Module 5	Lab	<u>13.33%</u>
Total Grade		100%

**ENTRY-LEVEL SKILLS**

Students should demonstrate hand eye coordination, manual dexterity, and be able to work in an industrial environment.

**PREREQUISITES**

None

**CO-REQUISITES**

None