



**AUT 142
CLIMATE CONTROL SYSTEMS
COURSE SYLLABUS**

****Instructors will provide students with additional course-specific information, including attendance/makeup policies, assignment/test scheduling, and instructor contact information, as necessary and appropriate.****

Prerequisite(s): **AUT 122**

Corequisite(s):

Quarter(s) Offered: **All**

Class Hours: **5**

Lab Hours: **3**

Credit Hours: **6**

Course Description: Introduces the theory and operation of automotive heating and air conditioning systems. Students attain proficiency in inspection, testing, service, and repair of heating and air conditioning systems and related components. Topics include a/c system diagnosis and repair; refrigeration system component diagnosis and repair; heating, ventilation, and engine cooling systems diagnosis and repair; operating systems and related controls diagnosis and repair; refrigerant recovery, recycling, and handling.

Student Learning Outcomes: Upon successful completion of this course, the student should be able to:

A/C System Diagnosis and Repair

- Diagnose unusual operating noises in the A/C system; determine necessary action.
- Identify refrigerant type; conduct a performance test of the A/C system; determine necessary action.
- Leak test A/C system; determine necessary action.
- Inspect the condition of discharged oil; determine necessary action.
- Select oil type; measure, and add oil to the A/C system as needed.

Refrigeration System Component Diagnosis and Repair

- Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
- Inspect A/C compressor drive belts; replace and adjust as needed.

- Inspect, test, and replace A/C compressor clutch components or assembly.
- Remove and replace A/C compressor and mountings.
- Determine need for A/C system filter; perform necessary action.
- Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action.
- Inspect A/C condenser for airflow restrictions; perform necessary action.
- Remove and install receiver/drier or accumulator/drier.
- Remove and install expansion valve or orifice (expansion) tube.
- Inspect evaporator housing water drain; perform necessary action.

Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair

- Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
- Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.
- Inspect engine cooling and heater system hoses and belts; perform necessary action.
- Inspect, test, and replace thermostat and housing.
- Determine coolant condition; drain and recover coolant.
- Flush system; refill system with recommended coolant; bleed system.
- Inspect and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action.
- Inspect and test electrical fan control system and circuits.
- Inspect and test heater control valve(s); perform necessary action.

Operating Systems and Related Controls Diagnosis and Repair

- Diagnose failures in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action.
- Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.
- Test A/C compressor load cut-off systems; determine necessary action.
- Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) 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 ducts, doors, hoses, and outlets; perform necessary action.
- Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

Refrigerant Recovery, Recycling, and Handling

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

Grading Scale: The grading scale is detailed in the *Catalog and Student Handbook* and listed below for reference. All faculty members follow this scale when assigning grades to reflect a given student's performance in the classroom.

Grade	Numerical Equivalent	Grade Point
A/A*	90-100	4
B/B*	80-89	3
C/C*	70-79	2
D/D*	60-69	1
F/F*	0-59	0

Effective Summer Quarter 2006, Athens Technical College replaced the S/U grading system used for learning support classes with an A*-F* grading system. The registrar uses an asterisk (A*, B*, C*, D*, F*, W*, WF*, WP*) to designate learning support course grades on transcripts and grade reports because these grades are not components of the quarterly grade point average.

Required Textbook(s), including ISBN:

Title: *Modern Automotive Technology 7/e*
Author: Duffy (2009)
Publisher: Goodheart Wilcox.
ISBN: 978-1-59070-956-6

Supplementary Material(s): None Required

Required Equipment/Tools/Resources: Required Tool List will be provided by instructor

Instructional Technologies Employed:

The primary method of instruction for this course will be lecture, reading assignments, demonstrations, video presentations, and practical applications that include live lab experience.

Attendance: Regular class attendance is important and expected. The college considers both tardiness and early departure from class as forms of absenteeism. Students absent from class for any reason are still responsible for all work missed. Instructors have the right to determine whether work missed can be made up and have the liberty to set reasonable expectations for attendance **based on frequency of class meetings and on the instructional delivery method, subject, type, and level of the class.** Class attendance policies will be clearly stated for students by their respective instructors on separate documents (course outlines/schedules) or appendices to the master syllabus.

Grading Policy and Criteria

Grade distribution will be determined as follows:

Unit Exam Average: 33%
Lab Evaluation: 33%
Final Exam: 33%

Work Ethics:

To fulfill the responsibility to teach essential workplace ethics, the college evaluates program students on attendance, character, teamwork, appearance, attitude, productivity, organizational skills, communication, cooperation, and respect. Because students are preparing for employment, it is essential that they become accustomed to standards of behavior in the workplace. At the conclusion of the quarter, faculty members assign separate numerical work ethics grades which appear beside the course letter grades on both transcripts and grade reports. The work ethics grading scale is as follows: 3 (Exceeds Expectations), 2 (Meets Expectations), 1 (Needs Improvement), and 0 (Unacceptable).

Academic Honesty:

Academic honesty is expected at all times. Any student found to have engaged in academic misconduct such as cheating, plagiarism, or collusion is subject to disciplinary sanctions as outlined in the Student Code of Conduct detailed in the *ATC Catalog and Student Handbook*. The term “plagiarism” includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment. The term “collusion” includes, but is not limited to, the unauthorized collaboration with any other person in preparing work offered for academic credit. Students are advised that faculty routinely use **turnitin.com** both to prevent plagiarism and to assist in verifying when/if it has occurred.

Course Withdrawal:

Students may withdraw from a course without academic penalty until the midpoint of the quarter (as stated in the Academic Calendar published in the *ATC Catalog and Student Handbook*). By withdrawing before the midpoint of the quarter, the student is automatically assigned a grade of W, which does not affect quarterly or cumulative grade point average. Grades of W will affect satisfactory academic progress for financial aid purposes. **Students who stop attending class(es) without formally withdrawing risk earning a final grade of F, which will appear on the academic transcript.** Refer to the *ATC Catalog and Student Handbook* for further details.

Academic Support Center:

The Academic Support Centers of Athens Technical College (ATC) provide free tutoring for enrolled students. Both instructors and peer tutors provide tutoring in almost all subjects offered by the college. Information about the Center is accessible via the ATC website at www.athenstech.edu. To find out the specific services available on the Athens, Greene, and Walton Campuses, please call (706) 583-2839. To contact the Academic Support Center on the Elbert County Campus, please call (706) 213-2129.

Americans with Disabilities Act:

Any student who believes he/she is eligible for accommodations in the classroom and/or during testing due to a documented disability is encouraged to contact the Director of Student Support Services at (706) 355-5081, or the Coordinator of Disability Services at (706) 355-5006, to apply for assistance. It is our goal at Athens Technical College to provide equal access to education for all students.

Cell Phones and Electronic Devices:

Students are strictly prohibited from using cell phones and personal electronic devices within college-owned/operated facilities without the explicit permission of a faculty or staff member.

Food/Drinks in Classroom:

Food and beverages (other than water) are not allowed in classrooms/labs.

Warranty of Graduates:

The Department of Technical and Adult Education warrants every graduate of technical programs in which students may earn technical certificates of credit, diplomas, or associate degrees. The warranty guarantees that graduates demonstrate the knowledge and skills and can perform each competency as identified in the industry-validated standards established for every program of study. If one of our graduates educated under a standard program or his/her employer finds that the graduate is deficient in one or more competencies as defined in the course/program standards, Athens Technical College will retrain the employee at no instructional cost to the employee or the employer. This guarantee is in effect for two years after graduation.

TEACH Act:

According to the TEACH Act of 2002, Athens Technical College is obligated to advise you that instructional material included in this course may be subject to copyright protection. As such, you must not share, duplicate, transmit, or store the material of this course beyond the purpose and time frame explicitly stated in the syllabus of your course. If you are not certain whether a particular piece of material is covered by copyright protection, you should contact your instructor and obtain his/her written clarification. Failing to observe copyright protection is a violation of law.

