

**Nashville State Community College
Business, Applied Arts & Technologies Division
Automotive Department/ GM ASEP Program**

Course Syllabus

GM Climate Control

AMT-1230

4 Credits, 3 Class Hours, 2 Laboratory Hours

Instructor: Claude Whitaker

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Office: W-58 Phone: 353-3449

Hours M - T- W 7:00-3:00 R- 7:00-2:00 F- 8:00-12:00

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Textbook and Other Materials:

Automotive Technology 4th edition, James D. Halderman General Motors Fundamental Curriculum Series Automotive HVAC, James Halderman, IAGMASEP 2003 Training Material

Supplemental material All Computer Based Training CD's, Service Know How videos, and Web Based Training IDLs are required to be completed for GM hands-on certification to be granted .

Course Description

This is a comprehensive course on the principles of operation and service techniques applied to automotive heating and air conditioning systems. Topics include components, testing, diagnosing, charging and repair practices. *Prerequisite: AMT 1190.*

Course Outcomes:

Upon completion of this course, the student should be able to:

1. Explain operational concepts in heating and air conditioning operations and answer questions on a formal written test.
2. Check and replace (as required) heating and air conditioning components on an actual automobile (thermostat, heater core, condenser, evaporator, and compressor).
3. Troubleshoot, evaluate, and charge an air conditioning system on a vehicle.

Course Assessments:

The student will be required to pass a series of on-the –car hands-on tasks set by the GM Service Technical College and the NATEF task list. (Task VII. Heating and Air Conditioning)

Evidence that the task have been met, the student will identify and interpret heating and air conditioning concern: determine necessary action. Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions and technical service bulletins. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals.)

Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration. Identify refrigerant type; conduct a performance test of the A/C system; determine necessary action. Leak test A/C system; determine necessary action. Determine recommended oil for system application. Diagnose A/C system conditions that cause the protection devices (pressure, thermal and PCM) to interrupt system operation; determine necessary action. Remove and reinstall A/C compressor and mountings; measure oil quantity; determine necessary action.

Inspect A/C condenser for airflow restrictions; perform necessary action. Remove and install receiver/drier or accumulator/drier; measure oil quantity; determine necessary action.

Perform cooling systems, 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 and coolant type for vehicle application; drain and recover coolant. Flush system; refill system with recommended coolant; bleed system. Inspect and test cooling fan, fan clutch, fan shroud and air dams; perform necessary actions. Inspect and test electric cooling fans; fan control system and circuits; determine necessary action. Inspect and test A/C heater blower, motors, resistors, switches, relays, wiring and protection devices; perform necessary action. Test and diagnose A/C compressor clutch control systems; determine necessary action. Perform correct use 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. All these tasks will be observe by me on a one-on-one basic when in the shop.

Grading Policy:

Grading of class:		Letter grade conversions:
Assignment /Lab Sheets	10%	A (90-100)
Unit & Mid-Term Tests (4)	20%	B (80-89)
Hands-on Components	40%	C (70-79)
Final Test	30%	D (60-69)

Lab Sheets are based on hands-on performance tasks per the GM Service Technical College and the NATEF task list.

NOTE: If the AVERAGE TOWARD FINAL GRADE is 90 or above (+ - assignments and lab sheets) you do not have to take the FINAL TEST.

If you have to take the FINAL TEST, the AVERAGE TOWARD FINAL GRADE and FINAL TEST are averaged for the FINAL LETTER GRADE.

Laboratory Guidelines

- Horseplay will not be tolerated
- When working under an automobile, you must use a creeper
- Use all hand or special tools properly
- Do not sit in an automobile unless you are making a check or test that requires you to
- Do not run the radio or change radio setting
- Do not move the seat unless necessary
- You must use fender covers when working under the hood
- Do not use any part of an automobile for a work bench
- Every automobile must have a work order on it
- Every automobile jacked up must have jack stands under it
- You must wear safety glasses when doing the following

Turning a drum/rotor	Balancing a wheel
Grinding	Drilling holes
Re-facing a valve	Using a blow gun

Topics to Be Covered:

Week 1

1. Introduction
 - A. History
 - B. Evaporator
 - C. Condenser
 - D. Overview of heating/air conditioning operations
2. Fundamental Definitions
Heat, BTU, heat transfer, temperature, liquids, solids, gasses, latent heat, condensation, evaporation, oils, boiling points, pressure/temperature relationships.

Week 2

1. Compressors
2. Evaporator

Week 3

1. Condenser
2. Receiver Dryer
3. Accumulator

Week 4

1. Flow control/metering devices
 - A. orifice tube
 - B. thermostatic expansion valve

Week 5

1. Magnetic Clutch Controls
2. Lubricator

Week 6

1. R-134A and R-12 characteristics
2. Service
 - A. Performance testing
 - B. Evacuate System
 - C. Charging/Discharging
 - D. Replacing Components

Week 7

1. Muffler
2. Distributor, Electrical/Vacuum
3. Heater
4. Course Review
5. Hands-on Testing

Attendance Policy

A student is expected to attend all scheduled classes and laboratories. Each instructor will formulate an attendance policy and provide it on the course syllabus. Absences are counted from the first scheduled meeting of the class, and it is the responsibility of each student to know the attendance policy of each instructor in whose class he/she is enrolled. If a student is absent from a class, he/she should give an advanced explanation to the instructor. Absences in a course may affect a student's final grade. The student is responsible for all assigned work in the course regardless of excused or unexcused absences. Tardiness may also affect a student's final grade.

Failure to attend class will result in a final course grade of "FA" or "FN" (see explanation below) depending on the individual instructor's course policy.

FA= failure, attendance-related (unofficial withdrawal) Last recorded date of attendance required.

FN= failure, never attended class (unofficial withdrawal)

Student Communication Channels

It is the student's responsibility to check D2L and MyNSCC email on a regular basis. These are the official communication channels between the college and students. Students are responsible for the information communicated through those channels. D2L contains specific course information and MyNSCC contains information important for other purposes.

Early Warning System

Nashville State Community College has implemented an Early Warning System to notify students via e-mail about academic problems such as poor classroom attendance, poor performance on assignments/tests, poor communication skills, late/missing assignments, and/or lack of classroom participation. Please note that Early Warning Alerts do not affect a student's academic standing.

ADA Compliance Statement

Nashville State complies with the Americans with Disabilities Act. If you wish to request any special accommodations for any courses in which you are enrolled, contact the Student Disabilities Office at 353.3721.

Classroom Misconduct

Nashville State Community College has a zero tolerance policy for disruptive conduct in the classroom. Students whose behavior disrupts the classroom will be subject to disciplinary sanctions. Please consult your Student Handbook for more specific details.

The instructor has primary responsibility for control over classroom behavior and maintenance of academic integrity. He/she can order temporary removal or exclusion from the classroom of any student engaged in disruptive conduct or in conduct which violates the general rules and regulations of the College.

Disruptive behavior in the classroom may be defined as, but is not limited to, behavior that obstructs or disrupts the learning environment (e.g., offensive language, harassment of students and professors, repeated outbursts from a student which disrupt the flow of instruction or prevent concentration on the subject taught, failure to cooperate in maintaining classroom decorum, etc.), the continued use of any electronic or other noise or light emitting device which disturbs others (e.g., disturbing noises from beepers, cell phones, palm pilots, lap-top computers, games, etc.).

Please be aware that children are not allowed in class or unattended on campus.

Academic Dishonesty (Honor Code)

Any form of academic dishonesty, cheating, plagiarizing, or other academic misconduct is prohibited. "Plagiarism may result from: (1) failing to cite quotations and borrowed ideas, (2) failing to enclose borrowed language in quotation marks, and (3) failing to put summaries and paraphrases in your own words (A Writer's Reference 331). Academic dishonesty may be defined as, but is not limited to, intentionally trying to deceive by claiming credit for the work of another person, using information from a web page or source without citing the reference, fraudulently using someone else's work on an exam, paper, or assignment, recycling your own work from another course, purchasing papers or materials from another source and presenting them as your own, attempting to obtain exams/materials/assignments in advance of the date of administration by the instructor, impersonating someone else in a testing situation, providing confidential test information to someone else, submitting the same assignment in two different classes without requesting both instructor's permission, allowing someone else to copy or use your work, using someone else's work to complete your own, altering documents, transcripts or grades, and forging a faculty/staff member's signature.

In addition to other possible disciplinary sanctions that may be imposed through regular college procedures as a result of academic dishonesty the instructor has the authority to assign an “F” or a “Zero” for the exercise, paper, or examination or to assign an “F” for the course. Students may appeal through the appropriate college grade appeal procedures.

Inclement Weather Policy

In the event of an inclement weather event, check the Nashville State web site home page at www.nsc.edu for announcements on campus closures. Campus closures will also be announced on local television stations (channels 2, 4, 5, and 17).

When classes are cancelled, an online assignment will be posted in NS Online. Check your NS Online email for a message from your instructor regarding your online assignment requirements. Even though classes may be cancelled, some areas, i.e. Testing Center, may be open. However, you should check before commuting to campus.

The Vice President for Academic Affairs and the Director of Security are responsible for cancellation decisions during an inclement weather event for the Nashville State main campus and the Southeast campus. Cookeville, Waverly, and Dickson Campus Directors will make class cancellation decisions based on conditions in their respective areas. Decisions about class cancellations are based on actual conditions, not forecasts. The perspective used for making decisions is that of the college as an employer, not as a K-12 institution. Students should use their own best judgment in determining whether to report to campus during inclement weather when classes are not cancelled.

NOTE: This syllabus is meant simply as a guide and overview of the course. Some items are subject to change or may be revised at the instructor’s discretion. Each instructor will further clarify their criteria for grading, classroom procedures, attendance, exams and dates, etc. on his/her course syllabus.