

Aiken High School

Automotive Technology 1, 2, & 3

Instructor Contact Information:

Stevan Smith
Room F-2
Phone: 803-641-2500 (Ext. 136)
Email: stevans@acpsd.net

Prerequisites:

In Automotive Technology 1, 2, and 3, students must have the right combination of academic skills and a strong mechanical ability. They must be able to utilize applied math and algebra. They must be able to read and understand technical information and follow directions. They must be willing to operate technical equipment, work independently and in group participation. They must be willing to get involved in tasks that require concentration, problem solving and logical reasoning. To take Automotive Technology 2, students must successfully complete all requirements for Automotive Technology 1. To take Automotive Technology 3, students must successfully complete all requirements for Automotive Technology 2 and be recommended by the instructor.

Course Description:

In Automotive Technology 1, 2, and 3, students will gain knowledge and skills for entering a career in automotive service and repair. In these courses, students will learn about career opportunities as an automotive technician. Students will learn about and practice safety and HAZ-MAT procedures in an automotive shop. They will also learn about various tools and equipment used in an automotive shop. In these courses, instruction and experiences include: the functioning, servicing, and repairing of electrical/electronic systems, brake systems, suspension and steering systems, engine performance, heating/AC, automatic transmission/transaxle, and manual drive train and rear axles. Students will be exposed to a variety of basic subjects including the following: developing problem solving skills, time management, co-operative working and proper use of tools, equipment and reference materials.

Course Standards and Outline:

Automotive Technology 1, 2, and 3 South Carolina State Standards

Unit 1 - Automotive Technician Career:

1. Identify the major systems of an automobile.

3. Demonstrate the proper selection and operation of a fire extinguisher.
4. Identify the necessary steps for personal safety in the shop.
5. Identify personal protective equipment such as safety glasses and explain their use in an automotive shop and the importance of that use.
6. Demonstrate how to protect your hands from the hazards found in an automotive shop.
7. Describe how to properly lift a heavy object and demonstrate the process.
8. Define the special training and necessary First Aid Steps required to deal with Blood Borne Pathogens.
9. Demonstrate the safe use and proper maintenance of pneumatic and hydraulic tools including m4Aicle lifts.
10. Identify, describe, and record all unsafe or potentially unsafe conditions or acts, environmental noncompliance, malfunctions, and health or industrial hygiene problems.

Unit 5 - HAZ-MAT:

1. Identify and define hazardous materials by chemical and physical properties, such as color, corrosivity, density, flammability, reactivity, specific gravity, and toxicity.
2. Define the hazardous-materials and hazardous-waste emergency-situations regulatory process.
3. Identify the airborne gases found in the automotive shop and explain the hazards that they present.
4. Demonstrate the required methods to use when cleaning brake and clutch components.
5. Define the process for hazardous material spill control in an automotive shop.
6. Apply federal, state, and local regulations when storing and disposing of chemical materials and waste and know where to find current information about implementing these regulations.
7. Maintain, understand, and follow material safety data sheets (MSDS).
8. Read and interpret the appropriate MSDS for proper hazard recognition and safety precautions when handling automotive materials.
9. Dg'fco kkt'y kj "ōtki j v'q'hpqy ö'rgi kurvqp0

Unit 7/8/9 - Tools & Equipment:

1. Identify, select, and demonstrate the proper use of common hand tools used in the automotive industry.
2. Demonstrate the proper use and maintenance of power and pneumatic tools found in the Automotive Shop.
3. Identify different types of torque wrenches and demonstrate their proper usage.
4. Repair internal and external threads.
5. Define the following terms: clamping force, tensile strength, yield strength, and shear strength.
6. Identify the different types of fasteners, and their grade or property class.
7. Calculate any conversions such as English to metric and fractions to decimals.
8. Make Celsius or Fahrenheit measurements for the base unit of degrees for temperature, read and apply a thermometer eW*nBT/F4 12 Tf1 o Tf100912 0 612 792 reW*nen9(g)10(th,)-11(y)20(i)-1(T@d/F3 12 Tf

1. Check windshield washer fluid and other fluid levels.
2. Check seat belts.
- 3.

5. Inspect and replace wheel studs. (AT1)
6. Remove and reinstall sealed wheel-bearing assembly. (AT2)
7. Remove, clean, and inspect pads and remaining hardware; determine necessary action. (AT1)
8. Clean, inspect, and measure rotor for run-out, parallelism, and minimum thickness using a dial machine or replace. (AT1)
9. Use a dial indicator to measure total indicator runout (TIR).
10. Remove, clean (using proper safety procedures), inspect, and measure brake drums; determine necessary action. (AT1)
11. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. (AT1)
12. Preadjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings. (AT1)
13. Install wheel, torque lug nuts, and make final checks and adjustments. (AT1)

A6 - Electrical/Electronics:

1. Explain atomic theory in relation to battery operation using like and unlike charges.
2. Define the term valence and its meaning to electricity.
3. Explain the terms conductor, insulator, and semi-conductor; and differentiate between their functions.
4. Define voltage, current, resistance, voltage drop, and conductance.
5. Define the two theories of current flow, conventional and electron), and explain which one the automotive industry uses and why.
6. Explain the difference between DC and AC current.
7. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems. (AT1)
8. Using Ohm's law, calculate voltage, current, and resistance.
9. Identify and use automotive symbols, schematics, and diagrams.
10. Check electrical circuits with a test light; determine necessary action. (AT2)
11. Check electrical circuits using fused jumper wires; determine necessary action. (AT2)
12. Describe the purpose and operation of a battery.
13. Explain battery ratings, Cold Cranking Amps (CCA), and Reserve Capacity (RC) ratings.
14. Identify battery safety procedures.
15. Inspect, clean, fill, and replace battery. (AT2)
16. Perform slow/fast battery charge. (AT2)
- 17.

30. Inspect and test sensors, connectors, and wires of electronic instrument circuits; determine necessary action. (AT2)
31. Remove and reinstall door panel and instrument panel (dash) panel. (AT1)

A7 - Heating/AC:

1. Remove and replace radiator. (AT2)
2. Inspect, test, remove, and replace water pump. (AT2)
3. Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration. (AT1)

26. Explain the operation of an electronic fuel injection system including speed density, mass airflow, airflow meter, throttle bodies, idle controls, and injectors. (AT3)
27. Check fuel for contaminants and quality; determine necessary action. (AT3)
28. Inspect and test cold enrichment system components; adjust or replace as needed. (AT3)
29. Inspect and test fuel injectors; clean and replace. (AT3)
30. Identify and interpret engine performance concern; determine necessary action. (AT3)
31. Inspect engine assembly for fuel, oil and coolant levels and leaks; determine needed repairs. (AT3)
32. Diagnose unusual engine noise or vibration problems; determine needed repairs. (AT3)
33. Diagnose unusual exhaust color, odor, and sound; determine necessary action. (AT3)
34. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. (AT3)
35. Perform cylinder power balance test; determine necessary action. (AT3)
36. Perform cylinder compression tests; determine necessary action. (AT3)
37. Perform cylinder leakage test; determine necessary action. (AT3)
38. Diagnose engine mechanical, electrical, electronic, fuel, and ignition problems with oscilloscope and/or engine diagnostic equipment; determine necessary action. (AT3)
39. Prepare 4- or 5-gas analyzer, inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings and determine necessary action. (AT3)
40. Record information related to an exhaust emission inspection. (AT3)
41. Explain the function and identify the use of a thermometer and a pyrometer. (AT3)
42. Verify engine-operating temperature; determine necessary action. (AT3)
43. Verify correct camshaft timing. (AT3)

Required Materials:

Each student will need the following materials:

- Coveralls
- Work Boots
- Safety Glasses
- A Pencil and/or Pen (blue or black ink)
- Composition Notebook

Course Assignments:

- Major Assignments (Tests and Shop Activities)
- Daily Assignments (Classwork, Worksheets, Journals, and Summaries)
- Class Participation (In-class discussions, small group work, and preparation for class)

Grading Criteria:

Students will be evaluated based on rubrics for the following:

- Major Assignments (Tests and Shop Activities) - 80%
- Daily Assignments (Classwork and Worksheets) & Class Participation (In-class discussions, small group work, preparation for class, and Shop/Tool Cleaning) - 20%

Grading Scale:

- A - 100% - 90%
- B - 89% - 80%
- C - 79% - 70%
- D - 69% - 60%
- F - 59% and below

Late Work:

Deadlines will be established for assignments/projects. Work turned in late will receive partial credit. Assignments/projects that are not completed one (1) week after the deadline will receive no credit. Any assignments/projects that are not completed one (1) week prior to the end of the quarter will receive no credit. Exceptions can be made for students who are returning to school from an excused absent. It is the school's policy that students who are returning to school from an excused absence must provide a doctor's note or other appropriate documentation to the school.

Student Behavior:

Each student is responsible for his or her behavior and is subject to the school rules as stated in Aiken School District's Student Handbook. Students who are disruptive, disrespectful, or who engage in any behavior that is detrimental to the learning environment or the safety of others will be subject to disciplinary action. In all such situations, administration will be immediately notified and in-turn parents.

9. Cars can only be brought to shop with permission and a pass.
10. Cleaning of the tools is the responsibility of the student having used the tools.
11. Due to a large number of students in the class, all backpacks and coats will be kept in the safety area. This will prevent tripping hazards.
12. Due to the nature of our training, no sandals, sneakers or open-toe shoes will be allowed in the class or shop. This rule will be strictly enforced.
13. Each student is expected to work quietly, and have proper instruction, and permission, before using any piece of equipment.
14. Each student will be required to help clean up the classroom and shop. This includes sweeping floors.
15. Jewelry will be removed before engaging in any skill in the shop. This can include any necklaces, rings and watches. Any earring must be removed if deemed a safety hazard.
16. No cell phones or electronic devices in the classroom or shop.
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