

Automotive Technology: Principles, Diagnosis, and Service

STRAND 1: Students will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

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Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team.

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Standard 3

Student will use critical thinking and problem-solving skills.

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

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Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

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Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

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STRAND 2: Students will participate in work-place readiness activities.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

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Standard 2

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

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STRAND 3: Students will understand and demonstrate general shop safety.

Standard 1

Learn safe working habits and procedures. Pass a safety test with 100 percent.

- Personal safety.
- Tool and equipment safety.
- Workplace safety.
- Personal protective equipment (PPE).

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Standard 2

Comply with safety rules for working with automotive chemicals.

- Chemical manufacturers provide a Safety Data Sheets (SDS) for each chemical they produce.
- Identify the location of and navigate through the SDS for critical information.
- Store and dispose of chemicals in properly labeled containers.

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Standard 3

Identify the gasses encountered in the automotive field and the hazards they present.

- Water, oxygen, nitrogen, carbon dioxide (CO₂), hydrocarbons (HC), oxides of nitrogen (NO_x), and carbon monoxide (CO).
- HC, NO_x, and CO can pose health and environmental problems if they are not controlled.

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Standard 4

Identify the hazards and control of asbestos dust.

- Asbestos is a carcinogen – a substance that causes cancer.
- Never use compressed air to clean brake assemblies.
- Understand approved methods such as a brake vacuum or brake washer machine.
- Because some exposure might be unavoidable, wear an approved filter mask.

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STRAND 4: Students will understand and demonstrate basic hand tools, fasteners, and shop equipment.

Standard 1

Identify and measure metric and standard fasteners.

- Machine screws, sheet metal screws, bolts, studs, nuts.
- Lock washers, keys, splines, pins, snap rings, setscrews, rivets.
- Head markings, thread series, right-hand and left-hand threads, major and minor diameters, thread pitch (TPI).

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Standard 2

Correctly identify and use basic hand tools.

- Screwdrivers, wrench, sockets, drive handles, extensions, pliers, hammer, chisels, punches, files, hacksaw, taps, dies, pullers, vises, drill bits, grinder.
- Describe the use of each of the above tools.

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Standard 3

Identify and demonstrate use of basic measuring tools (accurate to 1/32 or 1mm).

- Inside and outside calipers, dividers, dial indicator.
- Electrical testers, pressure gauges, feeler gauges.

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Standard 4

Complete a repair order including cause, concern, and correction, use reference manuals or information systems to find service procedures and specifications.

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- Computer oriented.
- Manuals.

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Standard 5

Locate proper lift points, raise and support the vehicle using jack, jack stands and a vehicle hoist.

- Use a jack and jack stands to raise and support a vehicle. p. 88
- Use a hoist to raise and support a vehicle and properly use safety locks to secure the vehicle. pp. 89-91

Standard 6

Properly de-energize potential energy from vehicle using manufacturers suggested lock out tag out procedures. p. 42

STRAND 5: Students will understand and demonstrate proper techniques in removal and installation of tires and wheels.

Standard 1

Inspect tires for abnormal wear.

- Proper inflation. p. 134
- Mechanical problems (no specific angles). pp. 134-136

Standard 2

Properly rotate tires and reinstall using proper torque procedures.

- Use manufacturer recommended tire rotation method. p. 135
- Lug nuts should be tightened to the proper torque as indicated in the vehicle specifications and in a sequence of cross or star pp. 135-136

Standard 3

Interpret tire sidewall markings: size, inflation, age, and load.

- Tire type. p. 1292
- Section width in millimeters. pp. 1300-1301
- Aspect ratio. p. 1823
- Speed rating. p. 1297
- Construction type. p. 1305
- D.O.T. number p. 1300
- Rim diameter. p. 1299

Standard 4 (Optional)

Dismount, inspect, and remount a tire on a wheel (including TPMS).

- Use the proper equipment. pp. 1338-1342
- Use the correct techniques and safety precautions. pp. 1338-1342

Standard 5 (Optional)

Use a tire balancer to balance tires of a vehicle using proper procedures.

- Correctly mount wheel to the balancer. p. 1333
- Correctly balance a wheel and tire assembly. p. 1333

Standard 6 (Optional)

Locate a leak and identify proper repair procedures.

- Inspect interior and exterior of the tire. pp. 1323-1324
- Determine if the tire can be repaired. pp. 1337-1342
- Repair the tire damage correctly. pp. 1337-1342
- Verify tire repair. pp. 1337-1342

STRAND 6: Students will identify basic automotive parts and perform basic services on a vehicle.

Standard 1

Identify basic automotive parts and functions.

- Identify engine parts.

- Block, crankshaft, camshaft, piston, cylinder head, connecting rod, valve train, timing components.
- Fuel systems: injector, filter, lines, pump, tank.
- Ignition systems: spark plugs, coil(s).
- Cooling systems: radiator(s), pump(s), thermostat(s), fan(s).
- Identify drive train parts.
- Manual transmission.
- Automatic transmission.
- Drivelines.
- Drive axels.
- Identify brake parts.

- Master cylinder, lines, caliper, rotor, drum, wheel cylinder, pads, shoes.
- Identify steering and suspension parts.
- Rack and Pinion.
- Steering gear.
- Tie-rod.
- Shocks/struts.
- Springs: leaf, coil, torsion bar, air.
- Identify electrical parts.
- Battery
- Alternator
- Starter
- Circuit protection: fuse, breaker
- Hybrid or Electric Vehicle Components.

Standard 2

Based on the manufacture's specifications, perform under hood checks.

- Inspect and adjust available fluid levels.
- Check belt tension and condition.
- Check condition of hoses.
- Inspect wiper blades.
- Check air filter.

Standard 3

At the correct interval, perform lube, oil, and filter service. Use proper disposal methods for waste oil and filters.

- Change engine oil and filter using recommended oil viscosity and filter.
- Check for and lubricate available components and fittings.

Standard 4

Inspect and service battery.

- Check battery voltage with the engine off.
- Check battery voltage with engine running.
- Properly jumpstart a vehicle (excluding hybrid or electric vehicle's).
- Inspect and clean 12-Volt battery and cables.

Standard 5

Check shocks or struts.

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- Visual inspection. pp. 1379-1380
- Check for proper operation. pp. 1379-1380

Standard 6

Understand the four-stroke cycle.

- Intake p. 144
- Compression p. 144
- Power p. 144
- Exhaust p. 144

Standard 7

Check brakes.

- Lining thickness. p. 1161
- Fluid leaks. pp. 126-128
- Park brake function. pp. 1196-2000
- Rotor condition. pp. 584-585

Standard 8

Check lights.

- Visually inspect bulbs. pp. 623-626
- Replace accessible light bulbs as needed. pp. 623-626

STRAND 7: Students will identify basic emission components. (Optional)

Standard 1

Identify common emission components.

- PCV system or equivalent pp. 955-956
- EVAP system pp. 943-948
- Catalytic converter pp. 223-224

Standard 2

Run an emission test on a vehicle.

- Hydrocarbons p. 933
- Carbon monoxide p. 933
- Oxides of Nitrogen (NOx) p. 934
- Check readiness monitors. p. 939

STRAND 8: Students will solve basic mathematical equations related to automotive.

Standard 1

Solve whole number problems with two- and three-digits.

- Addition p. 101
- Subtraction p. 101
- Multiplication p. 101
- Division p. 101

Standard 2

Solve fraction problems.

- Addition
- Subtraction
- Multiplication p. 102

- Division p. 102

Standard 3

Solve decimal problems with two- and three-digits.

- Addition p. 101
- Subtraction p. 101
- Multiplication p. 101
- Division p. 101

Standard 4

Solve conversion problems.

- Fraction-to-decimal p. 101
- Decimal-to-fraction p. 101
- Decimal-to-percent p. 101
- Percent-to-decimal p. 101

Standard 5

Solve basic ratio-to-proportion problems.

pp. 102-104

Standard 6

Solve basic linear-measurement problems.

- Measure using the Imperial system
- Measure using the Metric system pp. 95-96

STRAND 9: Students will be able to conduct a Vehicle Inspection.

Standard 1

Students will be able to identify and properly perform a vehicle inspection. (Optional) Refer to the Utah State Vehicle Safety Inspection Manual - <https://highwaypatrol.utah.gov/wp-content/uploads/sites/21/2015/03/2011-2012-SI-PLT-Manual.pdf>.

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Standard 2

Understand the need of scanning vehicle systems.

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