

STRANDS AND STANDARDS

AUTOMOTIVE, INTRO



Course Description

This is an entry-level course in Automotive Service. Through demonstrations, lectures, research, and practical projects, this course introduces students to a broad experience in the use of shop equipment, tools, materials, processes, and techniques of automotive service. This is a one-semester course of instruction.

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|--------------------------------------|-------------------------------------|
| Intended Grade Level | 10-12 |
| Units of Credit | 0.5 |
| Core Code | 40.09.00.00.020 |
| Concurrent Enrollment Core Code | 40.09.00.13.020 |
| Prerequisite | N/A |
| Skill Certification Test Number | 505 |
| Skill Certification Cut Score | 72% |
| Test Weight | 0.5 |
| License Area of Concentration | CTE and/or Secondary Education 6-12 |
| Required Endorsement(s) | |
| Endorsement 1 | Automotive Service |
| Endorsement 2 | N/A |

STRAND 1: SHOP SAFETY

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).

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.

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.

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 or clutch assemblies.
- Understand approved methods such as a brake and clutch vacuum or brake and clutch washer machine.
- Because some exposure might be unavoidable, wear an approved filter mask.

Standard 5

Identify potential electrical safety hazards.

- Standard Automotive Battery
- Electric Vehicle
- Loss of Isolation

Performance Skills

Understand general shop safety.

- Pass a safety test with 100 percent.
- Comply with safety rules for working with automotive chemicals.
- Identify the gasses encountered in the automotive field and the hazards they present.
- Identify the hazards and control of asbestos dust.
- Identify high voltage (orange cables).
- Identify Yellow (SRS systems).
- Identify and comply with safety of batteries and electric vehicles.

STRAND 2: TOOLS & EQUIPMENT

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).

Standard 2

Correctly identify, use, and maintain basic hand tools.

- Screwdrivers, torque wrench, wrench, sockets, drive handles, extensions, pliers, hammer, chisels, punches, files, hacksaw, taps, dies, pullers, vises, drill bits, grinder.

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, tread depth gauge.

Standard 4

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

- Computer oriented.
- Manuals.

Standard 5

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

- Use a hand jack or road-side repair kit.
- Use a jack and jack stands to raise and support a vehicle.
- Use a hoist to raise and support a vehicle and properly use safety locks to secure the vehicle.

Standard 6

Properly de-energize potential energy from vehicles using manufacturers suggested lock out tag out procedures.

- Keyless and start/stop system
- Hybrid/Electric Vehicle systems

Performance Skills

- Understand basic hand tools, fasteners, and shop equipment.
- Measure metric and standard fasteners.
- Correctly identify, use and maintain basic hand tools, including torque wrench.
- Demonstrate use of basic measuring tools (accurate to 1/32 or 1mm).
- Complete a repair order including cause, concern, and correction, use reference manuals or information systems to find service procedures and specifications.
- Safely and properly lift a vehicle using a jack with roadside emergency kits.
- Safely and properly lift a vehicle using jack stands and a vehicle hoist.
- Properly de-energize potential energy from vehicles.
- Demonstrate applicable lock out tag out procedures.

STRAND 3: TIRES & WHEELS

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

Standard 1

Inspect tires for abnormal wear.

- Proper inflation.
- Mechanical problems (no specific angles).

Standard 2

Properly rotate tires and reinstall using proper torque procedures.

- Use manufacturer recommended tire rotation method.
- Lug nuts should be tightened to the proper torque as indicated in the vehicle specifications and in a sequence of criss-cross or star patterns depending on the number of lug nuts.

Standard 3

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

- Tire type
- Section width in millimeters
- Aspect ratio
- Speed rating
- Construction type
- D.O.T. number
- Rim diameter
- Tire Pressure Monitoring System (TPMS)

Standard 4 (Optional)

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

- Use the proper equipment.
- Use the correct techniques and safety precautions.

Standard 5 (Optional)

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

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

Standard 6 (Optional)

Locate a leak and identify proper repair procedures.

- Inspect interior and exterior of the tire.
- Determine if the tire can be repaired.
- Repair the tire damage correctly.
- Verify tire repair.

Performance Skills

Understand proper techniques in removal and installation of tires and wheels.

- Inspect tires for abnormal wear.
- Properly rotate tires and reinstall using proper torque procedures.
- Interpret tire sidewall markings: size, inflation, age, and load.
- (Optional) Dismount, inspect, and remount a tire on a wheel (including TPMS).
- (Optional) Use a tire balancer to balance tires of a vehicle using proper procedures.
- (Optional) Locate a leak and identify proper repair procedures.

STRAND 4: PARTS & SERVICES

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 axles.
- 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 manufacturer's specifications, perform under hood checks.

- Inspect and adjust available fluid levels.
- Check belt tension and condition.
- Check the condition of hoses.
- Inspect wiper blades.
- Check the 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.
- Under vehicle safety inspection (suspension, steering, exhaust).

Standard 4

Inspect and service battery.

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

Standard 5

Check brakes.

- Lining thickness.
- Fluid leaks.
- Park brake function.
- Rotor condition.

Standard 6 (Optional)

Understand the four-stroke cycle.

- Intake
- Compression
- Power
- Exhaust

Performance Skills

Perform basic services on a vehicle.

- Based on the manufacturer's specifications, perform under hood checks.
- At the correct interval, perform lube, oil, and filter service. Use proper disposal methods for waste oil and filters.
- Inspect and service 12-Volt battery.
- Check brakes.
- Properly change a vehicle light.
- Perform a visual vehicle inspection.

STRAND 5: AUTOMOTIVE MATH

Students will solve basic mathematical equations related to automotive tasks and concepts.

Standard 1

Solve whole and fractional/decimal problems (two- and three-digits).

- Addition
- Subtraction
- Multiplication
- Division

Standard 2

Solve conversion problems.

- Fraction-to-decimal
- Decimal-to-fraction
- Decimal-to-percent
- Percent-to-decimal

Standard 3

Identify basic ratios, proportions, and volumes.

- Fluids: gallon, liter, quart
- Units of measure: psi, kpa, foot, lbs, newton meters, inch

Standard 4

Solve basic linear-measurement problems.

- Measure using the Imperial system
- Measure using the Metric system

Performance Skills

Solve basic mathematical equations related to automotive.

- Solve whole number problems with two- and three-digits.
- Solve fraction problems.
- Solve decimal problems with two- and three-digits.
- Solve conversion problems.
- Solve basic ratio-to-proportion problems.
- Solve basic linear-measurement problems.
- Use basic ratios, proportions, and volumes when servicing a vehicle.

STRAND 6: EMISSIONS & INSPECTIONS (optional)

Students will identify basic emission components & inspections practices. This strand will not appear on the state skill certification exam.

Standard 1

Identify common emission components.

- Positive Crankcase Ventilation system (PCV) system or equivalent
- Evaporative Emission Control (EVAP) system
- Catalytic converter

Standard 2

Run an emission test on a vehicle.

- Hydrocarbons
- Carbon monoxide
- Oxides of Nitrogen (NO_x)
- Check readiness monitors.

Standard 3

Students will be able to identify and properly perform a vehicle inspection. Refer to the Utah State Vehicle Safety Inspection Manual as per Utah Highway Patrol (UHP).

Standard 4

Understand the need of scanning vehicle systems.

Performance Skills

Identify basic emission components.

- Identify common emission components.
- Run an emission test on a vehicle.
- Perform a vehicle inspection.

STRAND 7: CTSOs & WORKPLACE SKILLS

Students will be encouraged to participate in a relevant CTSO through the demonstration of automotive repair workplace and career readiness skills. These standards will not appear on state skill certification exams, but should be taught throughout the duration of the course.

Standard 1

Students will display personal skills related to the essential values, personality traits, and personal characteristics for success in automotive repair and life.

- **Integrity** - demonstrate honesty and personal responsibility for actions in repairing and maintaining vehicles.
- **Work ethic** - demonstrate tenacity, hard work, excellence, punctuality, meet deadlines; and be self-directed when completing tasks in the automotive repair classroom or shop.
- **Professionalism** - demonstrate maturity, self-confidence; and a positive image when working with teammates or clients on automotive repair jobs/projects.
- **Responsibility** - demonstrate dependability, consistency, and personal well-being when safely completing automotive repair tasks.
- **Adaptability/Flexibility** - Foster creativity, new ideas, and resilience when working to solve problems in automotive repair tasks.
- **Self-motivated** - demonstrate a willingness to learn, independence, initiative, and a positive attitude when approaching new information.

Standard 2

Students will display workplace skills related to the essential attitudes and abilities for success in the automotive repair industry.

- **Communication** – Demonstrates skills in listening and speaking; communicates professionally with teammates, supervisors, and customers in relation to automotive repair.
- **Decision making** – Analyzes key facts, data, and situations to employ reasoning skills for completing automotive repair tasks.
- **Teamwork** – Builds trusting relationships, works cooperatively with others and utilizes individual strengths of team members when completing automotive repair tasks.
- **Planning, organizing, and management** – Designs, prepares, and implements automotive repair tasks within a desired timeframe; Sets priorities and responds to changing priorities.
- **Leadership** – Builds positive relationships and mitigates conflict.

Standard 3

Students will display technical skills that are grounded in automotive repair that deliver essential knowledge and competencies for success in the industry.

- **Computer and technology literacy**
- **Job specific skills**
- **Safety and health**
- **Service orientation** – responds to internal and external customers; demonstrates focus and presence; attends to personal matters away from the classroom.
- **Professional development** – demonstrates openness to learn, grow, and change in the automotive repair industry.

Skill Certification Test Points by Strand

| Test Name | Test # | Number of Test Points by Strand | | | | | | | | | | Total Points | Total Questions |
|--------------------|--------|---------------------------------|----|---|----|---|---|---|---|---|----|--------------|-----------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | |
| Automotive, Intro. | 505 | 12 | 13 | 5 | 27 | 6 | 0 | 0 | | | | 63 | 50 |