

Automotive Services, Introduction

Exam Information	Description
Exam number 505 Items 50 National Career Cluster Transportation, Distribution, & Logistics Certification available Yes	This is an entry-level course in Automotive Service. Through demonstrations, lectures, research, and practical projects, this course introduces candidates 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.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Shop Safety	19%
2. Tools & Equipment	21%
3. Tires & Wheels	8%
4. Parts & Services	43%
5. Automotive Math	10%
6. Emissions & Inspections	0%
7. CTSOS & Workplace Skills	0%

*Includes performance skill evaluation

Standard 1 - Shop Safety

Candidates will understand and demonstrate general shop safety.

Objective 1 Learn safe working habits and procedures. Pass a safety test with 100 percent.

1. Personal safety.
2. Tool and equipment safety.
3. Workplace safety.
4. Personal protective equipment (PPE).

Objective 2 Comply with safety rules for working with automotive chemicals.

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

Objective 3 Identify the gasses encountered in the automotive field and the hazards they present.

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

Objective 4 Identify the hazards and control of asbestos dust.

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

Objective 5 Identify potential electrical safety hazards.

1. Standard Automotive Battery
2. Electric Vehicle
3. Loss of Isolation

Standard 2 - Tools & Equipment

Candidates will understand and demonstrate basic hand tools, fasteners, and shop equipment.

Objective 1 Identify and measure metric and standard fasteners.

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

Objective 2 Correctly identify, use, and maintain basic hand tools.

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

Objective 3 Identify and demonstrate use of basic measuring tools (accurate to 1/32 or 1mm).

1. Inside and outside calipers, dividers, dial indicator.
2. Electrical testers, pressure gauges, feeler gauges, tread depth gauge.

Objective 4 Complete a repair order including cause, concern, and correction, use reference manuals or information systems to find service procedures and specifications.

1. Computer oriented.
2. Manuals.

Objective 5 Locate proper lift points, raise and support the vehicle using jack, jack stands and a vehicle hoist.

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

Objective 6 Properly de-energize potential energy from vehicles using manufacturers suggested lock out tag out procedures.

1. Keyless and start/stop system
2. Hybrid/Electric Vehicle systems

Standard 3 - Tires & Wheels

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

Objective 1 Inspect tires for abnormal wear.

1. Proper inflation.
2. Mechanical problems (no specific angles).

Objective 2 Properly rotate tires and reinstall using proper torque procedures.

1. Use manufacturer recommended tire rotation method.
2. 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.

Objective 3 Interpret tire sidewall markings: size, inflation, age, and load.

1. Tire type.
2. Section width in millimeters.
3. Aspect ratio.
4. Speed rating.
5. Construction type.
6. D.O.T. number
7. Rim diameter.

Objective 4 (Optional) Dismount, inspect, and remount a tire on a wheel (including TPMS

1. Use the proper equipment.
2. Use the correct techniques and safety precautions

Objective 5 (Optional) Use a tire balancer to balance tires of a vehicle using proper procedures.

Objective 6 (Optional) Verify tire repair.

Optional: Standard performance evaluations on the final page of this document

Standard 4 - Parts & Services

Candidates will identify basic automotive parts and perform basic services on a vehicle.

Objective 1 Identify basic automotive parts and functions.

1. Identify engine parts.
2. Block, crankshaft, camshaft, piston, cylinder head, connecting rod, valve train, timing components.
3. Fuel systems: injector, filter, lines, pump, tank.
4. Ignition systems: spark plugs, coil(s).
5. Cooling systems: radiator(s), pump(s), thermostat(s), fan(s).
6. Identify drive train parts.
7. Manual transmission.
8. Automatic transmission.
9. Drivelines.
10. Drive axles.
11. Identify brake parts.
12. Master cylinder, lines, caliper, rotor, drum, wheel cylinder, pads, shoes.
13. Identify steering and suspension parts.
14. Rack and Pinion.
15. Steering gear.
16. Tie-rod.

17. Shocks/struts.
18. Springs: leaf, coil, torsion bar, air.
19. Identify electrical parts.
20. Battery
21. Alternator
22. Starter
23. Circuit protection: fuse, breaker
24. Hybrid or Electric Vehicle Components.

Objective 2 Based on the manufacturer's specifications, perform under hood checks.

1. Inspect and adjust available fluid levels.
2. Check belt tension and condition.
3. Check the condition of hoses.

Objective 3 At the correct interval, perform lube, oil, and filter service. Use proper disposal methods for waste oil and filters.

1. Change engine oil and filter using recommended oil viscosity and filter.
2. Check for and lubricate available components and fittings.
3. Under vehicle safety inspection (suspension, steering, exhaust).

Objective 4 Inspect and service battery.

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

Objective 5 Check brakes.

1. Lining thickness.
2. Fluid leaks.
3. Park brake function.
4. Rotor condition.

Objective 6 (Optional) Understand the four-stroke cycle.

1. Intake
2. Compression
3. Power
4. Exhaust

Optional: Standard performance evaluations on the final page of this document.

Standard 5 - Automotive Math

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

Objective 1 Solve whole and fractional/decimal problems (two- and three-digits).

1. Addition
2. Subtraction
3. Multiplication
4. Division

Objective 2 Solve conversion problems.

1. Fraction-to-decimal
2. Decimal-to-fraction
3. Decimal-to-percent
4. Percent-to-decimal

Objective 3 Identify basic ratios, proportions, and volumes.

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

Objective 4 Solve basic linear-measurement problems.

Standard 6 - Emissions & Inspections

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

Objective 1 Identify common emission components.

1. PCV system or equivalent
2. EVAP system
3. Catalytic converter

Objective 2 Run an emission test on a vehicle.

1. Hydrocarbons
2. Carbon monoxide
3. Oxides of Nitrogen (NOx)
4. Check readiness monitors.

Objective 3 Candidates will be able to identify and properly perform a vehicle inspection. Refer to the Utah State Vehicle Safety Inspection Manual as per UHP.

Objective 4 Understand the need of scanning vehicle systems.

Standard 7 - CTSOS & Workplace Skills

Candidates will be encouraged to participate in a relevant CTSO by demonstrating automotive repair workplace and career readiness skills, which should be taught throughout the course but will not appear on state skill certification exams.

Objective 1 Candidates will display personal skills related to the essential values, personality traits, and personal characteristics for success in automotive repair and life.

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

Objective 2 Candidates will display workplace skills related to the essential attitudes and abilities for success in the automotive repair industry.

1. Communication - Demonstrates skills in listening and speaking; communicates professionally with teammates, supervisors, and customers in relation to automotive repair.
2. Decision making - Analyzes key facts, data, and situations to employ reasoning skills for completing automotive repair tasks.
3. Teamwork - Builds trusting relationships, works cooperatively with others and utilizes individual strengths of team members when completing automotive repair tasks.
4. Environmental Awareness - Builds rapport with peers and fosters appropriate workplace relationships and interaction; respects differing opinions.
5. Planning, organizing, and management - Designs, prepares, and implements automotive repair tasks within a desired timeframe; Sets priorities and responds to changing priorities.
6. Leadership - Builds positive relationships and mitigates conflict.

Objective 3 Candidates will display technical skills that are grounded in automotive repair that deliver essential knowledge and competencies for success in the industry.

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

Optional: Standard performance evaluations on the final page of this document

Performance Skills Evaluation

Exam name: Automotive Services, Introduction

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Standard 3 – General Shop Safety

- 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.

Pass:

Standard 4 – Hand Tools, Fasteners, and Shop Equipment

- Understand basic hand tools, fasteners, and shop equipment.
- Measure metric and standard fasteners.
- Correctly identify and use basic hand tools.
- 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.
- Locate proper lift points, raise and support the vehicle using jack stands and a vehicle hoist.
- Properly de-energize potential energy from vehicle

Pass:

Standard 5 – Tire and Wheel Removal and Installment

- 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.

Pass:

Standard 6 – Basic Automotive Parts and Services

- Perform basic services on a vehicle.
- Identify basic automotive parts and functions.
- 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 shocks or struts.

Pass:

- Understand the four-stroke cycle.
- Check brakes.

Standard 7 – Basic Emission Components

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

Pass:**Standard 8 – Automotive Mathematical Equations**

- 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.

Pass:**Evaluator Name:****Date:**