

# Strands & Standards

## INTRODUCTION TO AUTOMOTIVE



### COURSE DESCRIPTION

This is an entry-level course in Automotive Service. Through demonstrations, lectures, research and practical experiences is designed to introduce the student to a broad experience in the use of equipment, tools, materials, processes and techniques of automotive service. This is a one-semester course of instruction.

#### License Type

CTE and/or  
Secondary Education 6-12

#### Required Endorsement

Automotive Service

Intended Grade Level: 10-12

Units of Credit: 0.5

Core Code: 40.09.00.00.020

CE Core Code: 40.09.00.13.020

Prerequisite: None

Skill Certification: 505

Test Weight: 0.5

## **STRAND 1** Students will be able to understand 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.
- Standard 2** Comply with safety rules for working with automotive chemicals.
- Chemical manufacturers provide a material safety data sheet (MSDS) for each chemical they produce.
  - Store 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(CO<sub>2</sub>), hydrocarbons(HC), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO).
  - HC, NO<sub>x</sub>, 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 assemblies.
  - Use a vacuum source or flush with water.
  - Because some exposure might be unavoidable, wear an approved filter mask.

## **STRAND 2** Students will be able to understand 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.
- 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.
- Standard 3** Identify and demonstrate use of basic measuring tools (accurate to 1/32 or 1mm).
- Micrometers, inside and outside calipers, dividers, dial indicator, dial calipers.
  - Electrical testers, pressure gauges, feeler gauges.
- 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.
  - Printed manuals.
- Standard 5** Properly raise and support vehicles using jack stands and a frame contact hoist.
- Use a jack and jack stands to raise and support a vehicle.
  - Use a frame hoist to raise and support a vehicle and properly use safety locks to secure the vehicle.

## **STRAND 3** Students will be able to understand 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** Remove a tire from a wheel.
- Use the proper equipment.
  - Use the correct techniques and safety precautions.
- Standard 3** Properly rotate tires and reinstall using proper torque procedures.
- Use either the conventional or radial tire rotation method.
  - Lug nuts should be tightened to the proper torque as indicated in the vehicle specifications and in a sequence of cross or star patterns depending on the number of lug nuts.
- Standard 4** Use a tire balancer to balance tires of a vehicle using proper procedures.
- Static balance – equal distribution of weight around the wheel.
  - Dynamic balance – equal distribution of weight on each side of the wheel.
- Standard 5** Locate a leak and identify proper repair procedures.
- Buff the area slightly larger than the patch.
  - Apply the cement with a brush.
  - Apply the patch and firmly role the patch using a stitcher tool.
- Standard 6** Interpret tire sidewall markings: size, inflation, and load.
- Tire type.
  - Section width in millimeters
  - Aspect ratio
  - Speed rating
  - Construction type
  - Rim diameter

## **STRAND 4** Students will be able to identify and perform basic services on a vehicle.

- Standard 1** Locate and identify basic automotive parts.
- 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, pump, thermostat
  - 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.
    - Steering gear: worm gear vs. rack and pinion
    - Tie-rod
    - Shocks / Struts
    - Springs: leaf, coil, torsion bar, air
  - Identify electrical parts.
    - Battery
    - Alternator
    - Starter
    - Circuit protection: fuse, breaker

- Standard 2** Based on the manufacture's specifications, check and adjust all vehicle fluid levels.
- Check belt tension and condition
  - Check condition of hoses
  - Check coolant strength and leaks
- Standard 3** Change engine oil and filter on a vehicle, using proper disposal methods for waste oil.
- Lubricate chassis
  - Check air filter
- Standard 4** With a voltmeter, check battery voltage.
- With the engine running.
  - With the engine off.
  - Properly jumpstart a vehicle.
- Standard 5** Check shocks or struts.
- Check for leakage.
  - Check for proper operation.
- Standard 6** Understand the four stroke cycle.
- Intake
  - Compression
  - Power
  - Exhaust
- Standard 7** Check brakes.
- Lining thickness
  - Fluid leaks
  - Park brake function
- Standard 8** Check lights.
- Visually inspect bulbs.
  - Replace light bulbs as needed.

## **STRAND 5** Students will be able to identify basic emission components. (Optional)

- Standard 1** Identify common emission components.
- PVC system
  - EGR valve
  - Catalytic converter
- Standard 2** Run an emission test on a vehicle.
- Hydro carbons
  - Carbon monoxide
  - Oxides of Nitrogen (NOx)

## **STRAND 6** Students will be able to solve basic mathematical equations related to automotive.

- Standard 1** Solve whole number problems with two- and three-digits.
- Addition
  - Subtraction
  - Multiplication
  - Division
- Standard 2** Solve fraction problems.
- Addition
  - Subtraction
  - Multiplication
  - Division

**Standard 3** Solve decimal problems with two- and three-digits.

- Addition
- Subtraction
- Multiplication
- Division

**Standard 4** Solve conversion problems.

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

**Standard 5** Solve basic ratio-to-proportion problems.

**Standard 6** Solve basic linear-measurement problems.

- Measuring using the Imperial system.
- Measuring using the Metric system.

## **STRAND 7** Students will be able to identify and properly perform a vehicle inspection. (Optional)

**Standard 1** Inspect a vehicle's ownership, glass, lights, and accessories.

- Check for vehicle registration.
- Inspect vehicle windshield and other glass for excessive damage, breakage, inadequate movement, and unsafe alterations.
- Inspect vehicle headlights and auxiliary lights for correct aiming; inspect headlights, auxiliary lights, tail lights, brake lights, turn signals, and other lights for malfunction, damage, or other unsafe conditions.
- Inspect vehicle windshield wipers, windshield washers, windshield defrosters, horn, speedometer, odometer, and automatic transmission/starter interlock for damage or malfunction.

**Standard 2** Inspect a vehicle's brakes, steering and suspension, and tires.

- Inspect vehicle tires and wheels for excessive wear, damage, mismatched sizes, and improper mounting and illegal studs.
- Inspect vehicle steering and suspension assemblies for excessive wear, damage, missing parts, and improper functioning.
- Inspect altered vehicles to confirm that they conform to required tolerances for raised or lowered suspension and other changes.
- Using a brake plate or visual method, inspect vehicle brake systems for excessive wear, damage, missing parts, improper functioning, and other related safety hazards.

**Standard 3** Inspect a vehicle's exhaust and fuel systems.

- Inspect vehicle exhaust systems for excessive wear, damage, malfunction, and illegal configuration.
- Inspect vehicle fuel systems for damage, malfunction, or leakage.

**Standard 4** Inspect a vehicle's body.

- Inspect vehicle body, frame, motor mounts, fenders, bumpers, floor pan, doors, hood, seats, exterior mirrors, interior mirror, and seat belts for excessive damage, illegal configuration, missing parts, and malfunction of mechanical assemblies.
- Inspect "Sand" or "Dune" buggies to meet regular passenger car requirements.
- Inspect street rods and other modified vehicles to meet minimum equipment and safety requirements for limited use on public highways.

## **STRAND 8** Students will be able to understand the importance of employability and work habits.

- Standard 1** Integrity
- Standard 2** Punctuality
- Standard 3** Staying on task
- Standard 4** Productive team worker
- Standard 5** Leadership

## **STRAND 9** Students will gain an understanding of automotive service industry as a profession and will develop professional skills for the workplace.

- Standard 1** As a participating member of the SkillsUSA student organization complete the SkillsUSA Level 1 Professional Development Program.
  - Complete a self-assessment inventory and identify individual learning styles.
  - Discover self-motivation techniques and establish short-term goals.
  - Determine individual time-management skills.
  - Define future occupations.
  - Define awareness of cultural diversity and equity issues.
  - Recognize the benefits of conducting a community service project.
  - Demonstrate effective communication skills with others.
  - Participate in a shadowing activity.
  - Identify components of an employment portfolio.
  - Demonstrate proficiency in program competencies.
  - Explore what is ethical in the workplace or school.
  - Master a working knowledge of SkillsUSA.
    - State the SkillsUSA motto.
    - State the SkillsUSA creed.
    - Learn the SkillsUSA colors.
    - Describe the official SkillsUSA dress.
    - Describe the procedure for becoming a SkillsUSA officer.
- Standard 2** Understand how to use the skills obtained in Introduction to Automotive and how they relate to career opportunities.
- Standard 3** Display a professional attitude toward the instructor and peers.

\* SkillsUSA PDP requirements - recommended

## **Skill Certificate 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		
Introduction to Automotive	505	15	13	10	35		13				86	57

## **Performance Objectives**