



AUTOMOTIVE SERVICE TECHNICIAN

Introduction to Automotive

This is a program with a sequence of courses that prepares individuals to engage in the servicing and maintenance of all types of automobiles. Instruction includes training in safety, the diagnosis of malfunctions and repair of engines, fuel, electricity/electronics, cooling, brake systems, drive trains, and suspension systems. Instruction is also given in the adjustment and repair of individual components and systems. These courses are based on the Automotive Service Excellence (ASE) task list. Work ethics and productivity are an integral part of the classroom and lab activities of these courses.

USOE
3 November 2009

INTRODUCTION TO AUTOMOTIVE

Levels: Grades 10-12
Units of Credit: 0.5 minimum
CIP Code: 47.0604
Prerequisite: None

CORE STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD **Students will be able to understand general shop safety.**
470604-01

OBJECTIVES

- 470604-0101 Learn safe working habits and procedures. Pass a safety test with 100 percent.
- Personal safety.
 - Tool and equipment safety.
 - Workplace safety.
- 470604-0102 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.
- 470604-0103 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.
- 470604-0104 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.

STANDARD **Students will be able to understand basic hand tools, fasteners, and shop equipment.**
470604-02

OBJECTIVES

- 470604-0201 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.

- 470604-0202 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.
- 470604-0203 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.
- 470604-0204 Use reference manuals or information systems to find service procedures and specifications.
- Computer oriented.
 - Printed manuals.
- 470604-0205 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.

STANDARD
470604-03

Students will be able to understand proper techniques in removal and installation of tires and wheels.

OBJECTIVES

- 470604-0301 Inspect tires for abnormal wear.
- Proper inflation
 - Mechanical problems (no specific angles)
- 470604-0302 Remove a tire from a wheel.
- Use the proper equipment.
 - Use the correct techniques and safety precautions.
- 470604-0303 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.
- 470604-0304 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.
- 470604-0305 Locate a leak. Identify proper repair procedure.
- 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.
- 470604-0306 Interpret tire sidewall markings: size, inflation, and load.

- a. Tire type.
- b. Section width in millimeters
- c. Aspect ratio
- d. Speed rating
- e. Construction type
- f. Rim diameter

**STANDARD
470604-04**

Students will be able to identify and perform basic services on a vehicle.

OBJECTIVES

470604-0401

Locate and identify basic automotive parts.

- a. 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
- b. Identify drive train parts.
 - Manual Transmission
 - Automatic Transmission
 - Drivelines
 - Drive Axles
- c. Identify brake parts.
 - Master cylinder, lines, caliper, rotor, drum, wheel cylinder, pads, shoes
- d. Identify steering and suspension parts.
 - Steering gear: worm gear vs. rack and pinion
 - Tie-rod
 - Shocks / Struts
 - Springs: leaf, coil, torsion bar, air
- e. Identify electrical parts.
 - Battery
 - Alternator
 - Starter
 - Circuit protection: fuse, breaker

470604-0402

Based on the manufacture's specifications, check and adjust all vehicle fluid levels.

- a. Check belt tension and condition
- b. Check condition of hoses
- c. Check coolant strength and leaks

470604-0403

Change engine oil and filter on a vehicle. Use proper disposal methods for waste oil.

- a. Lubricate chassis
- b. Check air filter

- 470604-0404 With a voltmeter, check battery voltage with the engine running and with the engine off.
a. Properly jump start a vehicle
- 470604-0405 Check shocks or struts.
a. Check for leakage.
b. Check for proper operation.
- 470604-0406 Understand the four stroke cycle.
a. Intake
b. Compression
c. Power
d. Exhaust
- 470604-0407 Check brakes.
a. Lining thickness
b. Fluid leaks
c. Park brake function
- 470604-0408 Check lights.
a. Replace light bulbs as needed.

STANDARD **Students will be able to identify basic emission**
470604-05 **components. (Optional)**

OBJECTIVES

- 470604-0501 Identify common emission components.
a. What all do you want to add here?
- 470604-0502 Run an emission test on a vehicle.
a. What all do you want to add here?

STANDARD **Students will be able to solve basic mathematical equations**
470604-06 **related to automotive.**

OBJECTIVES

- 470604-0601 Solve whole number problems with two- and three-digits.
a. Addition
b. Subtraction
c. Multiplication
d. Division
- 470604-0602 Solve fraction problems.
a. Addition
b. Subtraction
c. Multiplication
d. Division
- 470604-0603 Solve decimal problems with two- and three-digits.
a. Addition
b. Subtraction
c. Multiplication
d. Division

- 470604-0604 Solve conversion problems.
- Fraction-to-decimal
 - Decimal-to-fraction
 - Decimal-to-percent
 - Percent-to-decimal
- 470604-0605 Solve basic ratio-to-proportion problems.
- What all do you want to add here?
- 470604-0606 Solve basic linear-measurement problems.
- Measuring using the Imperial system.
 - Measuring using the Metric system.

STANDARD
470604-07 **Students will be able to identify and properly perform a vehicle inspection. (Optional)**

OBJECTIVES

- 470604-0701 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.
- 470604-0702 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.
- 470604-0703 Inspect a vehicle's exhaust and fuel systems.
- Inspect vehicle exhaust systems for excessive wear, damage, malfunction, and illegal configuration.

- b. Inspect vehicle fuel systems for damage, malfunction, or leakage.

470604-0704

- Inspect a vehicle's body.
- a. 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.
 - b. 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.

**STANDARD
470604-08**

Students will be able to understand the importance of employability and work habits.

OBJECTIVES

- 470604-0801 Integrity
- 470604-0802 Punctuality
- 470604-0803 Staying on task
- 470604-0804 Productive team worker
- 470604-0805 Leadership

PROFESSIONAL DEVELOPMENT

**STANDARD
470604-09**

The student will understand the need for professional development.

OBJECTIVES

- 470604-0901 Complete a personal inventory.
- 470604-0902 Set and meet goals.
- 470604-0903 Be self-motivated.
- 470604-0904 Know how to make decisions.
- 470604-0905 Know how to manage time.
- 470604-0906 Organize personal belongings and lab equipment.
- 470604-0907 Learn to communicate verbally.
- 470604-0908 Write effective communications.
- 470604-0909 Establish a personal reading program.
- 470604-0910 Develop effective work skills and attitudes.
- 470604-0911* 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
470604-10**

The student will understand the need for leadership skills.

OBJECTIVES

- 470604-1001 Serve on a committee.
470604-1002 Prepare an agenda.
470604-1003 Assist in planning a meeting.
470604-1004 Review basic parliamentary procedure.
▪ Make a main motion.
470604-1005 Participate in a school project.
470604-1006 Attend a community meeting.
470604-1007 Practice effective speaking.
470604-1008 Present a three- to five-minute talk.
470604-1009 Implement a leadership project.
470604-1010* Master a working knowledge of SkillsUSA.
▪ Describe the meaning of the SkillsUSA emblem.
▪ State the SkillsUSA pledge.
▪ Describe the duties of a SkillsUSA officer.

**STANDARD
470604-11**

The student will understand the need for career planning.

OBJECTIVES

- 470604-1101 Define your future occupation.
470604-1102 Survey employment opportunities.
470604-1103 Report on a trade journal article.
470604-1104 Explore opportunities for advanced training.
470604-1105 Conduct a worker interview.
470604-1106 Contact a professional association.
470604-1107 Explore entrepreneurship opportunities.
470604-1108 Give a talk about your career.
470604-1109 Review career goals.

**STANDARD
470604-12**

The student will understand the importance of employability and work habits.

OBJECTIVES

- 470604-1201 Develop a list of work standards to follow at school and on the job.
470604-1202 Evaluate your personal ethics.
▪ Evaluate your personal ethics against acceptable workplace ethics.
470604-1203 Build a job search network.
470604-1204 Find job leads.
470604-1205 Write a resume.

- 470604-1206 Create a job portfolio.
- 470604-1207 Complete a job application.
- 470604-1208 Write a business letter and memo.
- 470604-1209 Participate in an actual or simulated job interview.

* SkillsUSA PDP requirements - optional but recommended