



HEAVY DUTY DIESEL Medium/Heavy Vehicle Systems

This course is the first in a sequence that prepares individuals to apply technical knowledge and skills to the specialized maintenance and repair of trucks, buses, and other commercial and industrial vehicles. Instruction covers training in four areas which includes safety and shop skills, preventive maintenance inspection, brake systems, and electrical and electronic systems. These courses could be 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
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MEDIUM/HEAVY VEHICLE SYSTEMS

Levels: Grades 10-12
Units of Credit: Semester
CIP Code: 47.0613
11 Digit Code: 40-09-00-00-065
11 Digit CE Code: 40-09-00-13-065
Test #:
License: CTE/Secondary
Endorsement: Diesel Technician
Prerequisite: None

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CORE STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD **Students will be able to understand general shop safety**
470613-01

OBJECTIVES

470613-0101 Learn safe working habits and procedures. Pass a safety test with 100 percent.
470613-0102 Identify the different types and hazards of solvents used.
470613-0103 Identify the different types, purposes, and hazards of automotive greases, oils, and additives.
470613-0104 Identify precautions in the use, handling, and storage of various solvents, cleaners, oils, greases, and additives.
470613-0105 Identify the gasses encountered in the diesel field and the hazards they present.
470613-0106 Identify the hazards and control of asbestos dust.
470613-0107 Comply with safety rules for working with automotive chemicals (MSDS).

STANDARD **Students will be able to understand basic hand tools, fasteners, and shop equipment.**
470613-02

OBJECTIVES

470613-0201 Identify and measure metric and standard fasteners.
470613-0202 Use the pressure washer to prepare projects to be worked on. (Optional)
470613-0203 Correctly identify and use basic hand tools.
470613-0204 Identify and demonstrate use of basic and precision measuring tools.
470613-0205 Use reference manuals or information systems to find R/R procedures and specifications.
470613-0206 Properly raise and support vehicles using jack stands and a frame contact hoist. Identify other shop equipment.
470613-0207 Properly use arc and acetylene welding equipment for the appropriate job.
470613-0208 Correctly identify and use torque wrenches.

STANDARD **Students will be able to understand proper techniques in preventative maintenance.**
470613-03

OBJECTIVES

470613-0301 Perform inspections and repairs on:

- Wheel bearings
- Engine inspections
- Checking lights
- Checking oil levels
- Changing oil
- Tire inspections
- Frame and chassis

STANDARD **Students will be able to maintain and repair brake systems.**
470613-04

Objectives

470613-0401 Identify the principles and components of the following brake systems.

- Air
- Parking
- Anti-locking (ABS)

470613-0402 Troubleshoot brake systems.

470613-0403 Service and recondition air brake systems.

470613-0404 Service and adjust air compressors and governors.

470613-0405 Service and recondition parking brakes.

STANDARD **Students will be able to identify and perform basic electrical/electronics system problems.**
470613-05

OBJECTIVES

470613-0501 General electrical diagnosis.

470613-0502 Battery diagnosis and repair.

470613-0503 Starting system diagnosis and repair.

470613-0504 Charging system diagnosis and repair.

470613-0505 Lighting systems diagnosis and repair.

470613-0506 Gauges and warning devices diagnosis.

470613-0507 related systems.

STANDARD **Students will be able to identify troubleshoot and repair engine systems.**
470613-06

OBJECTIVES

470613-0601 Troubleshoot and repair cooling systems.

470613-0602 Troubleshoot and repair lubrication systems.

- 470613-0604 Troubleshoot and repair induction and exhaust systems.
470613.0605 Troubleshoot and repair diesel fuel-injection systems and components.
- Inspect for operation and condition of the parts and systems, including fuel quality and consumption, safety shut-down devices, circuits, sensors, electronic governors, and flywheel.
 - Prime and bleed fuel-injection system.
 - Remove, test, and adjust injectors and nozzles.
 - Troubleshoot mechanical governors.
 - Remove, repair, and replace individual components as needed.

STANDARD **Students will be able to rebuild a cylinder-head assembly.**
470613-07

OBJECTIVES

- 470613-0701 Diagnose valve and head problems using the visual inspection method.
470613-0702 Diagnose valve and head problems using the compression-tester or cylinder air-pressure method.
470613-0703 Diagnose valve and head problems using the stethoscope method.
470613-0704 Disassemble engines.
470613-0705 Clean and inspect the heads for cracks, warpage, and injector sleeves.
470613-0706 Inspect the valve seat and check for warpage, burns, cracks, and stem and tip wear.
470613-0707 Grinds valve seats and reface valves.
470613-0708 Check and inspect springs for free height, distortion, and installed height.
470613-0709 Adjust the valve lash.

STANDARD **Students will be able to remove and replace camshaft assemblies.**
470613-08

OBJECTIVES

- 470613-0801 Remove and inspect camshaft bearings and lifters.
470613-0802 Time valve-drive assemblies.

STANDARD **Students will be able to rebuild a block assembly.**
470613-09

OBJECTIVES

- 470613-0901 Remove the pistons from the rod assemblies.
470613-0902 Measure out-of-round and cylinder taper using a dial bore gauge or micrometer.
470613-0903 Check the piston pins and boss for wear.
470613-0904 Measure the piston ring lands width, out-of-round, and taper.
470613-0905 Measure the piston ring gap in a cylinder bore.
470613-0906 Install and fit the piston pins.
470613-0907 Check the rod-and-piston assembly alignment.
470613-0908 Remove and replace the rod bearings.

470613-0909	Hone and clean the cylinders.
470613-0910	Install rings on the pistons.
470613-0911	Measure and check the crankshafts with a micrometer.
470613-0912	Check the bearing bore with a telescope gauge.
470613-0913	Reassemble engines using a plastic gauge.
470613-0914	Install oil seals.
470613-0915	Check for end play.

STANDARD **Students will be able to solve basic mathematical equations related to diesel.**
470613-10

OBJECTIVES

470613-1001	Solve addition, subtraction, multiplication, and division of whole number problems with two- and three-digits.
470613-1002	Solve addition subtraction, multiplication, and division of fraction problems.
470613-1003	Solve addition subtraction, multiplication, and division of decimal problems with two- and three-digits.
470613-1004	Solve fraction-to-decimal conversion problems.
470613-1005	Solve decimal-to-fraction conversion problems.
470613-1006	Solve decimal-to-percent conversion problems.
470613-1007	Solve percent-to-decimal conversion problems.
470613-1008	Solve basic ratio-to-proportion problems.
470613-1009	Solve basic linear-measurement problems.

STANDARD **Students will be able to identify and properly perform a vehicle inspection.**
470613-11

OBJECTIVES

470613-1101	Check for registration.
470613-1102	Inspect vehicle tires and wheels for excessive wear, damage, mismatched sizes, and improper mounting.
470613-1103	Inspect vehicle steering and suspension assemblies for excessive wear, damage, missing parts, and improper functioning.
470613-1104	Inspect altered vehicles to confirm that they conform to required tolerances for raised or lowered suspension and other changes.
470613-1105	Using a brake plate or visual method, inspect vehicle brake systems for excessive wear, damage, missing parts, improper functioning, and other related safety hazards.
470613-1106	Inspect vehicle windshield and other glass for excessive damage, breakage, inadequate movement, and unsafe alterations.
470613-1107	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.

- 470613-1108 Inspect vehicle windshield wipers, windshield washers, windshield defrosters, horn, speedometer, odometer, and automatic transmission/starter interlock for damage or malfunction.
- 470613-1109 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.
- 470613-1110 Inspect vehicle exhaust systems for excessive wear, damage, malfunction, and illegal configuration.
- 470613-1111 Inspect vehicle fuel systems for damage, malfunction, or leakage.

PROFESSIONAL DEVELOPMENT

STANDARD **Students will understand the need for professional development.**
470613-12

OBJECTIVES

- 470613-1201 Complete a personal inventory.
- 470613-1202 Set and meet goals.
- 470613-1203 Be self-motivated.
- 470613-1204 Know how to make decisions.
- 470613-1205 Know how to manage time.
- 470613-1206 Organize personal belongings and lab equipment.
- 470613-1207 Learn to communicate verbally.
- 470613-1208 Write effective communications.
- 470613-1209 Establish a personal reading program.
- 470613-1210 Develop effective work skills and attitudes.
- 470613-1211* 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 **Students will understand the need for leadership skills.**
470613-13

OBJECTIVES

- 470613-1301 Serve on a committee.
- 470613-1302 Prepare an agenda.
- 470613-1303 Assist in planning a meeting.
- 470613-1304 Review basic parliamentary procedure.
- Make a main motion.
- 470613-1305 Participate in a school project.

- 470613-1306 Attend a community meeting.
- 470613-1307 Practice effective speaking.
- 470613-1308 Present a three- to five-minute talk.
- 470613-1309 Implement a leadership project.
- 470613-1310* 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 470613-14 Students will understand the need for career planning.

OBJECTIVES

- 470613-1401 Define your future occupation.
- 470613-1402 Survey employment opportunities.
- 470613-1403 Report on a trade journal article.
- 470613-1404 Explore opportunities for advanced training.
- 470613-1405 Conduct a worker interview.
- 470613-1406 Contact a professional association.
- 470613-1407 Explore entrepreneurship opportunities.
- 470613-1408 Give a talk about your career.
- 470613-1409 Review career goals.

STANDARD 470613-15 Students will understand the importance of employability and work habits.

OBJECTIVES

- 470613-1501 Develop a list of work standards to follow at school and on the job.
- 470613-1502 Evaluate your personal ethics.
 - Evaluate your personal ethics against acceptable workplace ethics.
- 470613-1503 Build a job search network.
- 470613-1504 Find job leads.
- 470613-1505 Write a resume.
- 470613-1506 Create a job portfolio.
- 470613-1507 Complete a job application.
- 470613-1508 Write a business letter and memo.
- 470613-1509 Participate in an actual or simulated job interview.

* SkillsUSA PDP requirements - optional but recommended