

STRANDS AND STANDARDS

DIESEL 2



Course Description

This course is the second 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 the following areas: safety, diesel engine mechanics, drive trains, and electrical/electronic systems. Work ethics and productivity are an integral part of the classroom and lab activities of these courses.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.09.00.00.065
Concurrent Enrollment Core Code	40.09.00.13.065
Prerequisite	Diesel 1
Skill Certification Test Number	Industry tests 907, 908, 909, 910
Test Weight	1.0
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Diesel Technician
Endorsement 2	N/A
Endorsement 3	N/A



STRAND 1

Students will be able to understand and apply general shop safety.

Standard 1

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

Standard 2

Identify the different types and hazards of solvents used.

Standard 3

Identify the different types, purposes, and hazards of automotive greases, oils, and additives.

Standard 4

Identify precautions in the use, handling, and storage of various solvents, cleaners, oils, greases, and additives.

Standard 5

Identify the gasses encountered in the diesel field and the hazards they present.

Standard 6

Identify the hazards and control of asbestos dust.

Standard 7

Comply with safety rules for working with automotive chemicals (SDS).

Performance Skill

Understand and apply general shop safety.

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

STRAND 2

Students will be able to understand basic hand tools, fasteners, and shop equipment.

Standard 1

Identify and measure metric and standard fasteners.

Standard 2

Use the pressure washer to prepare projects to be worked on.

Standard 3

Correctly identify and use basic hand tools.

Standard 4

Identify and demonstrate use of basic and precision measuring tools.

Standard 5

Use reference manuals or information systems to find R/R procedures and specifications.

Standard 6

Properly raise and support vehicles using jack stands and a frame contact hoist. Identify other shop equipment.

Standard 7

Properly use arc and acetylene welding equipment for the appropriate job.

Standard 8

Correctly identify and use torque wrenches.

Performance Skill

Understand basic hand tools, fasteners, and shop equipment.

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

STRAND 3

Students will be able to understand proper techniques in preventative maintenance.

Standard 1

Perform inspections and repairs on the engine.

- Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.
- Inspect vibration damper.
- Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.
- Check engine oil level and condition; check dipstick seal.
- Inspect engine mounts for looseness and deterioration.

- Check engine for oil, coolant, air, fuel, and exhaust leaks (Engine Off and Running).
- Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.

Standard 2

Perform inspections and repairs on the fuel system.

- Check fuel tanks, mountings, lines, caps, and vents.
- Drain water from fuel system.
- Service water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.

Standard 3

Perform inspections and repairs on the air induction and exhaust systems.

- Check exhaust system mountings for looseness and damage.
- Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system and after treatment devices, if equipped.
- Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks.
- Inspect turbocharger for leaks; check mountings and connections.
- Check operation of engine compression/exhaust brake.
- Service or replace air filter as needed; check and reset air filter restriction indicator.
- Inspect and service crankcase ventilation system.

Performance Skill

Understand proper techniques in preventative maintenance.

- Perform inspections and repairs on the engine.
- Perform inspections and repairs on the fuel system.
- Perform inspections and repairs on the air induction and exhaust systems.

STRAND 4

Students will be able to maintain and repair brake systems.

Standard 1

Explain the principles and identify components of hydraulic brake systems.

Standard 2

Services and recondition hydraulic brake systems.

Standard 3

Identify the principles and components of the following brake systems.

- Air
- Parking
- Anti-locking (ABS)

Standard 4

Troubleshoot brake systems.

Standard 5

Service and recondition air brake systems.

Standard 6

Service and adjust air compressors and governors.

Standard 7

Service and recondition parking brakes.

Standard 8

Troubleshoot and service hydraulic booster.

Performance Skill

Maintain and repair brake systems.

- Explain the principles and identify components of hydraulic brake systems.
- Service and recondition hydraulic brake systems.
- Identify the principles and components of the following brake systems.
- Troubleshoot brake systems.
- Service and recondition air brake systems.
- Service and adjust air compressors and governors.
- Service and recondition parking brakes.
- Troubleshoot and service hydraulic booster.

STRAND 5

Students will be able to maintain and repair steering and suspension systems.

Standard 1

Identify causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.

Standard 2

Inspect and service steering shaft U-joint(s), slip joints, bearings, bushings, and seals.

Standard 3

Determine recommended type of power steering fluid; check level and condition.

Standard 4

Flush and refill power steering system; purge air from system.

Standard 5

Perform power steering system pressure, temperature, and flow tests.

Standard 6

Inspect and align pitman arm; replace as needed.

Standard 7

Check and adjust steering (wheel) stops; verify relief pressures.

Standard 8

Inspect and lubricate steering components.

Performance Skill

Maintain and repair steering systems.

- Identify causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.
- Inspect and service steering shaft U-joint(s), slip joints, bearings, bushings, and seals.
- Determine recommended type of power steering fluid; check level and condition.
- Flush and refill power steering system; purge air from system.
- Perform power steering system pressure, temperature, and flow tests.
- Inspect and align pitman arm; replace as needed.
- Check and adjust steering (wheel) stops; verify relief pressures
- Inspect and lubricate steering components.

STRAND 6

Students will be able to maintain and repair suspension systems.

Standard 1

Inspect front axles and attaching hardware.

Standard 2

Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.

Standard 3

Inspect shock absorbers, bushings, brackets, and mounts.

Standard 4

Identify causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems.

Standard 5

Check camber; determine needed action.

Standard 6

Check caster; adjust as needed.

Standard 7

Check and adjust toe settings.

Standard 8

Check front axle alignment (centerline).

Standard 9

Identify tire wear patterns; check tread depth and pressure.

Standard 10

Identify wheel/tire vibration, shimmy, pounding, hop (tramp) problems.

Standard 11

Inspect tire for proper application, (size, load range, position, and tread design).

Performance Skill

Maintain and repair suspension systems.

- Inspect front axles and attaching hardware.
- Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.
- Inspect shock absorbers, bushings, brackets, and mounts.
- Identify causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems.
- Check camber; determine needed action.
- Check caster; adjust as needed.
- Check and adjust toe settings.
- Check front axle alignment (centerline).
- Identify tire wear patterns; check tread depth and pressure.
- Identify wheel/tire vibration, shimmy, pounding, hop (tramp) problems.
- Inspect tire for proper application, (size, load range, position, and tread design).

STRAND 7

Students will be able to identify troubleshoot and repair engine systems.

Standard 1

Troubleshoot and repair cooling systems.

Standard 2

Troubleshoot and repair lubrication systems.

Standard 3

Troubleshoot and repair induction and exhaust systems.

Standard 4

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.

Performance Skill

Identify, troubleshoot, and repair engine systems.

- Troubleshoot and repair cooling systems.
- Troubleshoot and repair lubrication systems.
- Troubleshoot and repair induction and exhaust systems.
- Troubleshoot and repair diesel fuel-injection systems and components.

STRAND 8

Students will be able to solve basic mathematical equations related to diesel.

Standard 1

Solve addition, subtraction, multiplication, and division of whole number problems with two- and three-digits.

Standard 2

Solve addition subtraction, multiplication, and division of fraction problems.

Standard 3

Solve addition subtraction, multiplication, and division of decimal problems with two- and three-digits.

Standard 4

Solve fraction-to-decimal conversion problems.

Standard 5

Solve decimal-to-fraction conversion problems.

Standard 6

Solve decimal-to-percent conversion problems.

Standard 7

Solve percent-to-decimal conversion problems.

Standard 8

Solve basic ratio-to-proportion problems.

Standard 9

Solve basic linear-measurement problems.

Performance Skill

Solve basic mathematical equations related to diesel.

- Solve addition, subtraction, multiplication, and division of whole number problems with two- and three-digits.
- Solve addition subtraction, multiplication, and division of fraction problems.
- Solve addition subtraction, multiplication, and division of decimal problems with two- and three-digits.
- Solve fraction-to-decimal conversion problems.
- Solve decimal-to-fraction conversion problems.
- Solve decimal-to-percent conversion problems.
- Solve percent-to-decimal conversion problems.
- Solve basic ratio-to-proportion problems.
- Solve basic linear-measurement problems.

STRAND 9

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 2.

Standard 1

Understand and demonstrate reliability.

- Determine individual time management skills.
- Explore what's ethical in the workplace or school.
- Demonstrate awareness of government.
- Demonstrate awareness of professional organizations and trade unions.

Standard 2

Understand and demonstrate responsiveness.

- Define the customer.
- Recognize benefits of doing a community service project.
- Demonstrate social etiquette.
- Identify customer expectations.

Standard 3

Understand resiliency.

- Discover self-motivation techniques and establish short-term goals.
- Select characters of a positive image.
- Identify a mentor.

Standard 4

Understand and demonstrate workplace habits.

- Participate in a shadowing activity.
- Explore workplace ethics: codes of conduct.
- Recognize safety issues.
- Perform a skill demonstration.
- Exercise your right to know.

Standard 5

Understand and develop initiative.

- Develop personal financial skills.
- Develop a business plan.
- Investigate entrepreneurship opportunities.

Standard 6

Understand and demonstrate continuous improvement.

- Conduct a worker interview.
- Demonstrate evaluation skills.
- Examine ethics and values in the workplace.
- Develop a working relationship with a mentor.
- Construct a job search network.