

STRANDS AND STANDARDS

DIESEL 1



Course Description

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 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	1.0
Core Code	40.09.00.00.060
Concurrent Enrollment Core Code	40.09.00.13.060
Prerequisite	None
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 of cleaning equipment used.

- Solvent tanks
- Steam cleaners
- Pressure washer
- Blow gun

Standard 4

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

Standard 5

Identify the different types of electrical safety hazards.

- Shock dangers
- Carbon pile testing
- Starting and charging circuits
- Lead acid storage batteries

Standard 6

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

Standard 7

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

Standard 8

Identify the hazards and control of asbestos dust.

Standard 9

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 of cleaning equipment used.
- Identify the different types, purposes, and hazards of automotive greases, oils, and additives.

- Identify the different types of electrical safety hazards.
- 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 identify and safely use basic hand tools.

Standard 1

Correctly identify and use screw drivers.

- Standard
- Phillips
- Torx

Standard 2

Correctly identify and use socket wrenches.

- Standard
- Metric
- Deep well
- Impact
- Torx

Standard 3

Correctly identify and use combination wrenches.

- Standard
- Metric
- Adjustable
- Allen

Standard 4

Correctly identify and use pliers.

- Adjustable
- Needle nose
- Locking
- Diagonal cutters

Standard 5

Correctly identify and use hammers.

- Ball peen
- Soft face
- brass

Standard 6

Correctly identify and use specialty tools.

- Hacksaw
- Tube cutting tools
- Chisels and punches
- Tap and dies
- Gear and bearing pullers
- Files
- Torque wrench

Performance Skill

Identify and safely use basic hand tools.

- Correctly identify and use screw drivers.
- Correctly identify and use socket wrenches.
- Correctly identify and use combination wrenches.
- Correctly identify and use pliers.
- Correctly identify and use hammers.
- Correctly identify and use specialty tools.

STRAND 3

Students will be able to understand power tools.

Standard 1

Correctly identify and use electric power tools.

- Bench grinder
- Drill press
- Lathe

Standard 2

Correctly identify and use pneumatic power tools.

- Drill
- Ratchet
- Impact
- Hammer
- Blow gun

Standard 3

Correctly identify and use hydraulic tools.

- Porta powers
- Presses
- Pullers
- Track press

Performance Skill

Understand and demonstrate the use of power tools.

- Correctly identify and use electric power tools.
- Correctly identify and use pneumatic power tools.
- Correctly identify and use hydraulic tools.

STRAND 4

Students will be able to understand basic and precision measuring tools.

Standard 1

Identify and demonstrate use of dial calipers.

Standard 2

Identify and demonstrate use of micrometers.

Standard 3

Identify and demonstrate use of thickness gauges.

Performance Skill

Understand basic and precision measuring tools.

- Identify and demonstrate use of dial calipers.
- Identify and demonstrate use of micrometers.
- Identify and demonstrate use of thickness gauges.

STRAND 5

Students will be able to understand shop equipment.

Standard 1

Correctly identify and use lifts and hoists.

- Jack stands
- Bridge crane
- Jib crane
- Lifting
- Spreader bar
 - Lifting eyes
 - Slings
 - Chains
- Safety
 - Cribbing
 - Securing chains
- Come-a-longs

Standard 2

Correctly identify and use media blasting equipment.

- Glass bead
- Sand
- Media

Standard 3

Correctly identify and use fluid pressure testing.

- Transducers
- Flow rating equipment
- Hydraulic cylinder test
- Hydraulic pump and motor tester
- Nozzle tester

Performance Skill

Understand and demonstrate the use of shop equipment.

- Correctly identify and use lifts and hoists.
- Correctly identify and use media blasting equipment.
- Correctly identify and use fluid pressure testing.

STRAND 6

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

Standard 1

Perform inspections and repairs on:

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

STRAND 7

Students will be able to understand maintain and repair brake systems.

Standard 1

Explain the principles and identify components of hydraulic brake systems.

Standard 2

Service and recondition hydraulic brake systems.

Standard 3

Identify the principles and components of the following brake systems.

- Air
- Parking
- Air-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

Understand 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 8

Students will be able to identify and perform basic electrical/electronic system problems.

Standard 1

General electrical diagnosis.

Standard 2

Battery diagnosis and repair.

Standard 3

Starting system diagnosis and repair.

Standard 4

Charging system diagnosis and repair.

Standard 5

Lighting systems diagnosis and repair.

Standard 6

Gauges and warning devices diagnosis.

Standard 7

Related systems.

Performance Skill

Identify and perform basic electrical/electronic system problems.

- General electrical diagnosis.
- Battery diagnosis and repair.
- Starting system diagnosis and repair.
- Charging system diagnosis and repair.
- Lighting systems diagnosis and repair.
- Gauges and warning devices diagnosis.
- Related systems.

STRAND 9

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 10

Students will be able to rebuild a cylinder –head assembly.

Standard 1

Diagnose valve and head problems using the visual inspection method.

Standard 2

Diagnose valve and head problems using the compression-tester or cylinder air pressure method.

Standard 3

Diagnose valve and head problems using the stethoscope method.

Standard 4

Disassemble engines.

Standard 5

Clean and inspect the heads for cracks, warpage, and injector sleeves.

Standard 6

Inspect the valve seat and check for warpage, burns, cracks, and stem and tip wear.

Standard 7

Grinds valve seats and reface valves.

Standard 8

Check and inspect springs for free height, distortion, and installed height.

Standard 9

Adjust the valve lash.

Performance Skill

Rebuild a cylinder –head assembly.

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

STRAND 11

Students will be able to remove and replace camshaft assemblies.

Standard 1

Remove and inspect camshaft bearings and filters.

Standard 2

Time valve-drive assemblies.

Performance Skill

Remove and replace camshaft assemblies.

- Remove and inspect camshaft bearings and filters.
- Time valve-drive assemblies.

STRAND 12

Students will be able to rebuild a block assembly.

Standard 1

Remove the pistons from the rod assemblies.

Standard 2

Measure out-of-round and cylinder taper using a dial bore gauge or micrometer.

Standard 3

Check the piston pins and boss for wear.

Standard 4

Measure the piston ring lands width, out-of-round, and taper.

Standard 5

Measure the piston ring gap in a cylinder bore.

Standard 6

Install and fit the piston pins.

Standard 7

Check the rod-and-piston assembly alignment.

Standard 8

Remove and replace the rod bearings.

Standard 9

Hone and clean the cylinders.

Standard 10

Install rings on the pistons.

Standard 11

Measure and check the crankshafts with a micrometer.

Standard 12

Check the bearing bore with a telescope gauge.

Standard 13

Reassemble engines using a plastic gauge.

Standard 14

Install oil seals.

Standard 15

Check for end play.

Performance Skill

Rebuild a block assembly.

- Remove the pistons from the rod assemblies.
- Measure out-of-round and cylinder taper using a dial bore gauge or micrometer.
- Check the piston pins and boss for wear.
- Measure the piston ring lands width, out-of-round, and taper.
- Measure the piston ring gap in a cylinder bore.
- Install and fit the piston pins.
- Check the rod-and-piston assembly alignment.
- Remove and replace the rod bearings.
- Hone and clean the cylinders.
- Install rings on the pistons.
- Measure and check the crankshafts with a micrometer.
- Check the bearing bore with a telescope gauge.
- Reassemble engines using a plastic gauge.
- Install oil seals.
- Check for end play.

STRAND 13

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 14

Students will be able to identify and properly perform a vehicle inspection.

Standard 1

Check for registration.

Standard 2

Inspect vehicle tires and wheels for excessive wear, damage, mismatched sizes, and improper mounting.

Standard 3

Inspect vehicle steering and suspension assemblies for excessive wear, damage, missing parts, and improper functioning.

Standard 4

Inspect altered vehicles to confirm that they conform to required tolerances for raised or lowered suspension and other changes.

Standard 5

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 6

Inspect vehicle windshield and other glass for excessive damage, breakage, inadequate movement, and unsafe alterations.

Standard 7

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.

Standard 8

Inspect vehicle windshield wipers, windshield washers, windshield defrosters, horn, speedometer, odometer, and automatic transmission/starter interlock for damage or malfunction.

Standard 9

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.

Standard 10

Inspect vehicle exhaust systems for excessive wear, damage, malfunction, and illegal configuration.

Standard 11

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

Standard 12

Inspect "Sand" or "Dune" buggies to meet regular passenger car requirements.

Standard 13

Inspect street rods and other modified vehicles to meet minimum equipment and safety requirements for limited use on public highways.

Performance Skill

Identify and properly perform a vehicle inspection.

- Check for registration.
- Inspect vehicle tires and wheels for excessive wear, damage, mismatched sizes, and improper mounting.
- 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.
- 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.
- 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 vehicle exhaust systems for excessive wear, damage, malfunction, and illegal configuration.
- Inspect vehicle fuel systems for damage, malfunction, or leakage.
- 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 15

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 1.

Standard 1

Understand and demonstrate the attitude of cooperation.

- Develop awareness of cultural diversity and equality issues.
- Demonstrate effective communication with others.
- Apply team skills to a group project.
- Identify and apply conflict resolution skills.

Standard 2

Understand and demonstrate the ability of being resourceful and innovative.

- Discover self-motivation techniques and establish short-term goals.
- Measure/modify short-term goals.
- Review a professional journal and develop a three- to five-minute presentation.

Standard 3

Plan for your future career.

- Complete a self-assessment and identify individual learning styles.
- Define future occupations.
- Identify the components of an employment portfolio.
- List proficiency in program competencies.
- Complete a survey for employment opportunities.
- Create a job application.
- Assemble your employment portfolio.
- Employability skills: evaluate program comprehension.

Standard 4

Understand and demonstrate the ability to manage a project.

- Apply team skills to a group project.
- Observe and critique a meeting.
- Demonstrate business meeting skills.
- Explore supervisory and management roles in an organization.
- Identify and apply conflict resolution skills.
- Demonstrate evaluation skills.
- Manage a project and evaluate others.