Clemson University
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Education & Training Plan
Diesel Technician Certification Program with Externship

Student Full Name: _____

Start Date: _____ End Date: _____

Program includes National Certification & an Externship Opportunity
Mentor Supported

Clemson University Program with Externship

Course Code:	CLEM-TRDE-DIESEL
Program Duration:	6 Months
Course Contact Hours:	375
Student Tuition:	$3,999.00

Diesel Technician Program

In high demand for the coming years, diesel mechanics understand the ins and outs of powerful trucks and engines that hit the road every day to deliver products and services all over the world. This program is designed to provide trainees with a comprehensive understanding of modern diesel engines and commercial vehicles as well as sophisticated heavy equipment systems with electronic functions and advanced computer controls.

Diesel Technician Program

This program provides students the entry level skills required to start a career in automotive repair and maintenance. The program is delivered through an intensive hands-on lab approach allowing students to concentrate most of the class time on practical skills education and execution alongside supplemental online curriculum. The students will become proficient in preventative maintenance and inspections by performing procedures in electrical, brakes, lubrication, hub seals, HVAC, Aftertreatment systems, and diagnostics equipment. The students will be subjected to a work environment that will require them to adhere to all program guidelines and workplace practices to prepare them for industry partner placement. Program guidelines and workplace practices include safety, personal protective equipment, first aid principles, employability skills, CDL level 4 license applications, and employment preparation.

Education and National Certifications

- Students should have or be pursuing a high school diploma or GED
- There is a National Certification exam available to students who successfully complete this program:
- **Automotive Service Excellence (ASE) Automotive Maintenance and Light Repair (G1) Certification Exam**

Students who complete this comprehensive course are not only prepared for entry-level positions as technicians in diesel engine repair shops and related facilities, they will be eligible to sit for the Automotive Service Excellence (ASE) Automotive Maintenance and Light Repair (G1) certification exam. Certification will issue once candidates complete and submit the 1-year work experience requirement.

Program Objectives:

At the conclusion of this program, students will be able to:

- Understand the foundations and safety practices needed for successful diesel technician practices
- Delivery Electrical and Electronic Systems technical expertise
- Troubleshoot using On-Board Diagnostics
- Evaluate, diagnose and address tire, suspension, and brakes
- Evaluate, diagnose and address heating, ventilation and air conditioning
- Evaluate, diagnose and address exhaust aftertreatment systems
- Utilize preventative maintenance and inspection methods
- Prepare for national certification and employment

National Certification

Students who complete the Clemson University Diesel Technician program will be prepared to sit for the Automotive Service Excellence (ASE) Automotive Maintenance and Light Repair (G1) Certification national certification exam(s). In order to work as a Diesel Technician, many states nationwide are requiring that learners achieve national certification prior to working in that state. Students who complete this program are encouraged to complete the practical/clinical externship option with their program. This comprehensive program is designed to prepare students to sit for Automotive Service Excellence (ASE) Automotive Maintenance and Light Repair (G1) Certification exam(s). Students who complete this program can and do sit for the Automotive Service Excellence (ASE) Automotive Maintenance and Light Repair (G1) Certification national certification exam(s) and are qualified, eligible and prepared to do so.

Externship / Hands on Training / Practicum

Although not a requirement, once students complete the program, they have the ability to participate in an externship and/or hands on practicum so as to practice the skills necessary to perform the job requirements of a professional in this field. Students will be assisted with completing a resume and/or other requirements necessary to work in this field. All students who complete this program are eligible to participate in an externship and will be placed with a participating organization near their location. The institution works with national organizations and has the ability to place students in externship opportunities nationwide.

Clemson University contact: If students have any questions regarding this program including national certification and externships **, they should call Salley Ouellette of Clemson University at | (864) 656-2200 or via email at palmer4@clemson.edu**

Note : No refunds can be issued after the start date published in your Financial Award document.

About Clemson University!

Clemson Online, a unit reporting directly to the Provost, works closely with leadership teams across the University to develop, market, and deliver top-quality courses and programs in blended and online formats. The office provides vision, leadership, coordination, and expertise in support of faculty design, delivery, and evaluation of technology-enhanced, blended, and fully online courses and instructional materials. Dynamic, transformative, and unique eLearning opportunities characterize Clemson's approach to online teaching and learning.

Our Mission: Clemson Online provides strategic leadership for online education, emphasizing innovative teaching and superior learning outcomes to maximize student success in 21st-century academic and professional contexts.

Our Vision: Clemson Online will define the public web-grant university through measurable achievements in online education, research, and service. The office is committed to pursuing strategic opportunities, providing supportive resources, promoting superior educational quality, and ensuring faculty involvement and responsibility in shaping Clemson's online future.

Clemson University and Pearson Education

Clemson University's eLearning programs were developed in partnership with Pearson Education to produce the highest quality, best-in-class content and delivery necessary to enhance the overall student learning experience, boost understanding and ensure retention. Pearson Education is the premier content and learning company in North America offering solutions to the higher education and career training divisions of colleges and universities across the country aimed at driving quality education programs to ensure student success. Please visit us at **www.pearson.com** .

About Pearson Education

Welcome to Pearson. We have a simple mission: to help people make more of their lives through learning. We are the world's leading learning company, with 40,000 employees in more than 80 countries helping people of all ages to make measurable progress in their lives. We provide a range of education products and services to institutions, governments and direct to individual learners, that help people everywhere aim higher and fulfil their true potential. Our commitment to them requires a holistic approach to education. It begins by using research to understand what sort of learning works best, it continues by bringing together people and organizations to develop ideas, and it comes back round by measuring the outcomes of our products.

Diesel Technician Program Student Objectives:

The Diesel Technician Program is laid out in 8 sections:

1. Foundation and Safety

This section covers the classification of heavy duty vehicles and provides students with the importance of shop safety, personal protection equipment, and principals of first aid. Students will learn employability skills, workplace habits, and tool and equipment fundamentals. Course guidelines and online curriculum used for this section.

2. Electrical and Electronic Systems

This section covers principles of electricity, electric circuits, Electrical test instruments, vehicle batteries, starting systems, electrical wiring, body electrical systems, and sensors. Students will learn the fundamentals of circuits utilizing an electrical trainer in the lab and then relate to vehicle. Students will identify applications of electrical test instruments used in commercial vehicle service and will test fusible links, circuit breakers, relays, solenoids, fuses; and replace as needed. Utilizing testing instruments the students will test batteries and perform any maintenance necessary. Students will use wiring diagrams to diagnose electrical circuits and be able to install solderless terminals. Students will utilize their knowledge of circuits and troubleshoot instrument gage problems and maintenance of sensors on a truck. Labs and online curriculum used for this section.

3. On-Board Diagnostics

This section covers the use of relevant service information including diagnostic procedures utilizing a diagnostic scan tool. Students will interface with a vehicle's on-board computer and identify fault codes to determine needed action. Students will check and record electronic diagnostic codes; trip/operational data; monitor electronic data; clear codes; and determine further diagnosis. Labs utilizing Snap-on diagnostic scan tool/trainer and online curriculum used for this section.

4. Tire, Suspension, and Brakes

This section covers inspection of tires for proper application (size, load range, position, and tread design) and determine needed action. Students will identify wheel/tire vibration, shimmy, and hop problems. Check operation of tire pressure monitoring system (TPMS) and determine needed action. Students will identify wear patterns; check tread depth and pressure; determine needed action. Removal of wheel/tire assemblies; torque mounting hardware to specifications with a torque wrench. Students will remove and replace wheel assembly; check wheel seal axle flange gasket for leaks and perform needed action. They will also clean, inspect, lubricate, and replace wheel bearings; replace seals and wear rings; inspect and replace retaining hardware; adjust drive axle wheel bearings. Students will verify end play using the dial indicator method. An in-service inspection of the suspension system will be performed along with a leaf spring inspection. Students will be able to explain the basic operation of brake systems that will lead into service, adjustment, and repair of foundation brakes. Labs and online curriculum used for this section.

5. Heating Ventilation and Air Conditioning

This section covers the principals, diagnosis, maintenance and repair of Heating Ventilation and Air Conditioning (HVAC). Students will identify type of system and conduct performance test(s) on HVAC systems;

determine needed action. Students will Interface with vehicle's on-board computer and perform diagnostic procedures using Snap-On data scan tool. They will inspect, test, and adjust HVAC systems ducts, doors, and outlets; determine needed action. Students will identify causes of HVAC air and mechanical control problems; determine needed action. Labs and online curriculum used for this section.

6. Exhaust Aftertreatment Systems

This section will cover the fundamentals of exhaust emission aftertreatment systems. Students will explain the principles of operation of diesel exhaust emission aftertreatment systems. Describe and explain methods for performing inspection and diagnosis procedures on diesel exhaust aftertreatment systems. Students will perform an active regeneration procedure and have necessary skills to replace a diesel particulate filter (DPF). Labs and online curriculum used for this section.

7. Preventative Maintenance and Inspection

This section will cover the basis of establishing a preventative maintenance (PMI) schedule and practices. Students will identify items for an inspection checklist and develop and list the general guidelines for conducting preventative maintenance inspections. Students will perform a complete PMI inspection that will include: in-cab inspection, key-on inspection, engine-on inspection, a cab door inspection, body and component mountings, batteries and mountings, frame and suspension, electrical components, exhaust system, air brake systems, tires and wheels, and air-conditioning components. Students will become proficient in the requirements to perform a thorough PMI inspection required in the diesel service industry. Labs and online curriculum used for this section.

8. National Certification / Employment Preparation

Students will undergo a resume writing session that will prepare them for employer placement. Students will also start the application process to obtain **Automotive Service Excellence (ASE) Auto Maintenance & Light Repair (G1) certification** if required by employers.

Diesel Technician Program Detailed Student Objectives:

Electrical / Electronic Systems

At the conclusion of instruction in each area, the following detailed items outline those functions students will be able to perform successfully on the job.

General Electrical Systems

- ·Read and interpret electrical/electronic circuits using wiring diagrams.
- Check continuity in electrical/electronic circuits using appropriate test equipment.
- Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using appropriate test equipment.
- Check current flow in electrical/electronic circuits and components using appropriate test equipment
- Check resistance in electrical/electronic circuits and components using appropriate test equipment
- Locate shorts, grounds, and opens in electrical/electronic circuits
- Identify parasitic (key-off) battery drain problems; perform tests; determine needed action
- Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed

- Inspect and test spike suppression devices; replace as needed.
- Check frequency and pulse width signal in electrical/electronic circuits using appropriate test equipment

Battery

- Identify battery type; perform appropriate battery load test; determine needed action.
- Determine battery state of charge using an open circuit voltage test.
- Inspect, clean, and service battery; replace as needed.
- Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.
- Charge battery using appropriate method for battery type.
- Inspect, test, and clean battery cables and connectors; repair or replace as needed.
- Jump start a vehicle using jumper cables and a booster battery or appropriate auxiliary power supply using proper safety procedures.
- Perform battery capacitance test; determine needed action.
- Identify and test low voltage disconnect (LVD) systems; determine needed repair

Starting System

- Perform starter circuit cranking voltage and voltage drop tests; determine needed action.
- Inspect & test components (key switch, push button and/or magnetic switch) and wires and harnesses in the starter control circuit; replace as needed.
- Inspect and test, starter relays and solenoids/switches; replace as needed.
- Remove and replace starter; inspect flywheel ring gear or flex plate.

Charging System Diagnosis and Repair

- Test instrument panel mounted volt meters and/or indicator lamps; determine action
- Identify causes of a no charge, low charge, or overcharge problems; determine action
- Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.
- Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.
- Perform charging circuit voltage drop tests; determine needed action
- Remove and replace alternator
- Inspect, repair, or replace cables, wires, and connectors in the charging circuit

Lighting Systems

- Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action
- Identify causes of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation
- Test, aim, and replace headlights
- Test headlight & dimmer circuit switches, relays, wires, terminals, connectors, sockets, and control components/modules; repair or replace as needed
- Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays, wires, and control components/modules of parking, clearance, and taillight circuits;

- Inspect and test instrument panel light circuit switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace
- Inspect and test interior cab light circuit switches, bulbs/LEDs, sockets, low voltage disconnect (LVD), connectors, terminals, wires, and control components/modules
- Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed
- Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace as needed
- Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace
- Inspect and test reverse lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, wires and control components/modules; repair or replace as needed

Gauges and Warning Devices

- Interface with vehicle's on-board computer; perform diagnostic procedure, verify instrument cluster operations using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action
- Identify causes of intermittent, high, low, or no gauge readings; determine needed action
- Inspect and test gauge circuit sensor/sending units, gauges, connectors, terminals, and wires; repair or replace as needed
- Inspect and test warning devices (lights and audible) circuit sensor/sending units, bulbs/LEDs, sockets, connectors, wires, and control components/modules; repair or replace as needed

Related Electrical Systems

- Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action
- Identify causes of constant, intermittent, or no horn operation; determine needed action
- Inspect and test horn circuit relays, horns, switches, connectors, wires, clock springs, and control components/modules; repair or replace as needed
- Identify causes of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action
- Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, wires and control components/modules; repair or replace as needed
- Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed
- Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed
- Inspect and test side view mirror motors, heater circuit grids, relays, switches, connectors, terminals, wires and control components/modules; repair or replace as needed
- Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed
- Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, wires, and control components/modules; repair or replace as needed
- Identify causes of slow, intermittent, or no power window operation; determine needed action
- Inspect and test motors, switches, relays, connectors, terminals, wires, and control components/modules of power window circuits; repair or replace as needed
- Inspect and test block heaters; determine needed repairs.

- Inspect and test cruise control electrical components; determine needed action
- Inspect switches, relays, controllers, actuator/solenoids, connectors, terminals, and wires of electric door lock circuits
- Check operation of keyless and remote lock/unlock devices; determine needed action
- Inspect and test engine cooling fan electrical control components/modules, wiring; repair or replace as needed
- Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action
- Inspect causes of drive axle wheel bearing noise and check for damage; perform needed action
- Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; inspect and replace retaining hardware; adjust drive axle wheel bearings. Verify end play with dial indicator method

Brake Systems

At the conclusion of instruction in each area, the following detailed items outline those functions students will be able to perform successfully on the job.

Air Brakes - Air Supply and Service Systems

- Identify poor stopping, air leaks, premature wear, pulling, grabbing, dragging, or balance problems caused by supply and service system malfunctions; determine needed action
- Check air system build-up time; determine needed action
- Drain air reservoir/tanks; check for oil, water, and foreign material; determine needed action
- Inspect air compressor drive gear, belts and coupling; adjust or replace as needed
- Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed
- Inspect and test air system pressure controls: governor, unloader assembly valves, filters, lines, hoses, and fittings; adjust or replace as needed
- Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed
- Inspect and test air tank relief (safety) valves, one-way (single) check valves, two-way (double) check valves, manual and automatic drain valves; replace as needed
- Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed
- Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; replace as needed.
- Inspect and test stop light circuit switches, wiring, and connectors; repair or replace
- Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed
- Inspect and test brake relay valves; replace as needed
- Inspect and test quick release valves; replace as needed
- Inspect and test tractor protection valve; replace as needed
- Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed
- Inspect and test low pressure warning devices, wiring, and connectors; repair or replace
- Inspect and test air pressure gauges, lines, and fittings; replace as needed

Air Brakes - Mechanical/Foundation Brakes

- Identify poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problems caused by the foundation brake, slack adjuster, and brake chamber problems; determine needed action

- Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed
- Identify type, inspect and service slack adjusters; perform needed action
- Inspect camshafts, tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace as needed
- Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs
- Inspect and measure brake shoes or pads; perform needed action
- Inspect and measure brake drums or rotors; perform needed action

Air Brakes - Parking Brakes

- Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations
- Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed
- Inspect and test parking (spring) brake application and release valve; replace as needed
- Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations
- Identify and test anti compounding brake function

Hydraulic Brakes - Hydraulic System

- Identify poor stopping, premature wear, pulling, dragging, balance, or pedal feel problems caused by the hydraulic system; determine needed action
- Inspect and test master cylinder for internal/external leaks and damage; replace as needed
- Inspect hydraulic system brake lines, flexible hoses, and fittings for leaks and damage; replace as needed
- Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed
- Inspect and test brake pressure differential valve and warning light circuit switch, bulbs/LEDs, wiring, and connectors; repair or replace as needed
- Inspect disc brake caliper assemblies; replace as needed
- Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type

Hydraulic Brakes - Mechanical/Foundation Brakes

- Identify poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems caused by mechanical components; determine needed action
- Inspect and measure rotors; perform needed action
- Inspect and measure disc brake pads; inspect mounting hardware; perform needed action
- Check parking brake operation; inspect parking brake application and holding devices; adjust and replace as needed

Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)

- Observe antilock brake system (ABS) warning light operation (includes trailer and dash mounted trailer ABS warning light); determine needed action
- Inspect antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or electronic service tool(s); determine needed action

- Test antilock brake system (ABS) wheel speed sensors and circuits ; adjust or replace as needed
- Bleed the ABS hydraulic circuits
- Verify power line carrier (PLC) operations

Suspension & Steering Systems

At the conclusion of instruction in each area, the following detailed items outline those functions students will be able to perform successfully on the job.

Wheel Bearings

- Clean, inspect, lubricate and replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings. Verify end play with dial indicator method
- Identify, inspect or replace unitized/preset hub bearing assemblies.

Suspension and Steering

- Steering Systems - Steering Column
- Inspect and service steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft
- Check cab mounting and adjust ride height
- Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedure

Steering Systems - Steering Units

- Determine recommended type of power steering fluid; check level and condition; determine needed action
- Flush and refill power steering system; purge air from system
- Inspect and service power steering reservoir including filter, seals, and gaskets
- Inspect power steering pump drive gear and coupling.
- Inspect power steering pump, mountings, and brackets
- Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings
- Inspect integral type power steering gear(s) (single and/or dual) and mountings

Steering Systems - Steering Linkage

- Inspect pitman arm
- Check and adjust steering (wheel) stops; verify relief pressures
- Inspect and lubricate steering component

Suspension Systems (Chapter 26 Systems Unit)

- Inspect front axles and attaching hardware; determine needed action
- Inspect and lubricate kingpins, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action.
- Inspect shock absorbers, bushings, brackets, and mounts; replace as needed

- Inspect leaf springs, center bolts, clips, pins and bushings, shackles, U-bolts, insulators, brackets, and mounts; determine needed action
- Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, torque arms, related bushings, mounts, shims, and cams; determine needed action
- Inspect tandem suspension equalizer components; determine needed action
- Inspect & test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed
- Inspect air springs, mounting plates, springs, suspension arms, and bushings; replace as needed
- Measure and adjust ride height; determine needed action

Wheel Alignment Diagnosis, Adjustment, and Repair

- Describe camber; determine needed action
- Describe caster; determine needed action
- Describe toe settings

Wheels and Tires

- Identify tire wear patterns; check tread depth and pressure determine needed action
- Identify wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action
- Remove and install steering and drive axle wheel/tire assemblies; torque mounting hardware to specifications with a torque wrench
- Inspect tire for proper application, (size, load range, position, and tread design); determine needed action
- Inspect wheel/rims for proper application, hand hold alignment, load range, size, and design; determine needed action
- Check operation of tire pressure monitoring system (TPMS); determine needed action if applicable.

Frame and Coupling Devices

- Inspect and lubricate fifth wheel, pivot pins, bushings, locking mechanisms, and mounting hardware
- Inspect and lubricate sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.
- Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs
- Inspect frame hangers, brackets, and cross members in accordance with manufacturers' recommended procedures
- Inspect pintle hooks and draw bars, if applicable.

Heating, Ventilation & Air Conditioning Systems

At the conclusion of instruction in each area, the following detailed items outline those functions students will be able to perform successfully on the job.

HVAC Systems

- Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action
- Verify the need for service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action
- Identify system type and components (cycling clutch orifice tube - CCOT, expansion valve) on HVAC systems
- Retrieve diagnostic codes; determine needed action

A/C System and Components - A/C System - General

- Identify causes of temperature control problems in the A/C system; determine needed action
- Identify refrigerant and lubricant types required for application; determine needed action
- Identify A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action.
- Perform A/C system leak test; determine needed action
- Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic service tool(s) (including PC based software and/or data scan tools); determine needed action

A/C System and Components - Compressor and Clutch

- Inspect and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment
- Inspect and test A/C compressor clutch components or assembly
- Inspect, repair, or replace A/C compressor mountings and hardware
- A/C System and Components - Evaporator, Condenser, and Related Components
- Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action.
- Inspect and test A/C system condenser. Check for proper airflow and mountings; determine needed action.
- Inspect, clean, or repair evaporator housing and water drain; inspect and service/replace evaporator air filter.
- Identify and inspect A/C system service ports (gauge connections); determine needed action.
- Identify the cause of system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action.

Heating and Engine Cooling Systems

- Identify causes of outlet air temperature control problems in the HVAC system; determine needed action.
- Identify window fogging problems; determine needed action
- Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action.
- Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action.
- Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action.
- Inspect water pump; determine needed action.
- Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs.
- Recover, flush, and refill with recommended coolant/additive package; bleed cooling system.
- Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.

- Inspect and test heating system coolant control valve(s) and manual shutoff valves; determine needed action.
- Inspect and flush heater core; determine needed action.

Operating Systems and Related Controls - Air/ Mechanical

- Identify causes of HVAC air and mechanical control problems; determine needed action
- Inspect and test HVAC system air and mechanical control panel assemblies; determine needed action.
- Inspect, test, and adjust HVAC system air and mechanical control cables and linkages; determine needed action.
- Inspect and test HVAC system actuators and hoses; determine needed action
- Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action.

Preventative Maintenance & Inspection

At the conclusion of instruction in each area, the following detailed items outline those functions students will be able to perform successfully on the job**.**

Engine System - Engine

- Check engine starting/operation record idle and governed rpm
- Inspect vibration damper
- Inspect belts, tensioners, and pulleys; check and adjust belt tension; 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
- Check engine compartment wiring harnesses, connectors, and seals for damage and proper routing.

Engine System - 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

Engine System - Air Induction and Exhaust System

- 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.
- Inspect diesel exhaust fluid (DEF) system, to include tanks, lines, gauge pump, and filter.
- Inspect selective catalyst reduction (SCR) system; including diesel exhaust fluid (DEF) for proper levels, leaks, mounting and connections.

Engine System - Cooling System

- Check operation of fan clutch.
- Inspect radiator (including air flow restriction, leaks, and damage) and mountings.
- Inspect fan assembly and shroud.
- Pressure test cooling system and radiator cap.
- Inspect coolant hoses and clamps.
- Inspect coolant recovery system.
- Check coolant for contamination, additive package concentration, aeration, and protection level (freeze point).
- Service coolant filter.
- Inspect water pump.

Engine System - Lubrication System

- Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.
- Take an engine oil sample for analysis.
- Cab and Hood - Instruments and Control
- Inspect key condition and operation of ignition switch.
- Check warning indicators.
- Check instruments; record oil pressure and system voltage.
- Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable).
- Check HVAC controls

Check Operation of All Accessories

Using electronic service tool(s) or on-board diagnostic system; retrieve engine monitoring information; check and record diagnostic codes and trip/operational data (including engine, transmission, ABS, and other systems).

Cab and Hood - Safety Equipment

- Check operation of electric/air horns and reverse warning devices.
- Check condition of spare fuses, safety triangles, fire extinguisher, and all required decals.
- Inspect seat belts and sleeper restraints.
- Inspect wiper blades and arms.

Cab and Hood - Hardware

- Check operation of wiper and washer.
- Inspect windshield glass for cracks or discoloration; check sun visor.
- Check seat condition, operation, and mounting
- Check door glass and window operation.
- Inspect steps and grab handles
- Inspect mirrors, mountings, brackets, and glass.
- Record all observed physical damage.
- Lubricate all cab and hood grease fittings.

- Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.
- Inspect cab mountings, hinges, latches, linkages and ride height; service as needed.
- Cab and Hood - Heating, Ventilation, & Air Conditioning (HVAC)
- Inspect A/C condenser and lines for condition and visible leaks; check mountings.
- Inspect A/C compressor and lines for condition and visible leaks; check mountings.
- Check A/C system condition and operation; check A/C monitoring system, if applicable.
- Check HVAC air inlet filters and ducts; service as needed.

Electrical/Electronics - Battery and Starting Systems

- Inspect battery box(es), cover(s), and mountings.
- Inspect battery hold-downs, connections, cables, and cable routing; service as needed.
- Check/record battery state-of-charge (open circuit voltage) and condition.
- Perform battery test (load and/or capacitance).
- Inspect starter, mounting, and connections.
- Engage starter; check for unusual noises, starter drag, and starting difficulty.

Electrical/Electronics - Charging System

- Inspect alternator, mountings, cable, wiring, and wiring routing; determine action.
- Perform alternator output tests

Electrical/Electronics - Lighting System

- Check operation of interior lights; determine needed action
- Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action.
- Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action.

Frame and Chassis - Air Brakes

- Check operation of parking brake.
- Record air governor cut-in and cut-out setting (psi)
- Check operation of air reservoir/tank drain valves.
- Check air system for leaks (brakes released).
- Check air system for leaks (brakes applied).
- Test one-way and double-check valves
- Check low air pressure warning devices.
- Check emergency (spring) brake control/modulator valve, if applicable.
- Check tractor protection valve.
- Test air pressure build-up time
- Inspect coupling air lines, holders, and glad-hands.
- Check brake chambers and air lines for secure mounting and damage.
- Check operation of air drier.
- Inspect and record brake shoe/pad condition, thickness, and contamination.
- Inspect and record condition of brake drums/rotors.
- Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.

- Check operation and adjustment of brake automatic slack adjusters (ASA); check and record push rod stroke.
- Lubricate all brake component grease fittings.
- Check condition and operation of hand brake (trailer) control valve, if applicable.
- Perform antilock brake system (ABS) operational system self-test.
- Drain air tanks and check for contamination
- Check condition of pressure relief (safety) valves.

Frame and Chassis - Hydraulic Brakes

- Check master cylinder fluid level and condition.
- Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.
- Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.
- Check operation of hydraulic system: pedal travel, pedal effort, pedal feel
- Inspect calipers for leakage, binding and damage.
- Inspect brake assist system (booster), hoses and control valves; check reservoir fluid level and condition.
- Inspect and record brake lining/pad condition, thickness, and contamination.
- Inspect and record condition of brake rotors.
- Check antilock brake system wiring, connectors, seals, and harnesses for damage and proper routing.

Frame and Chassis - Drive Train

- Check operation of clutch, clutch brake, and gearshift.
- Check clutch linkage/cable for looseness or binding, if applicable.
- Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable
- Check clutch adjustment; adjust as needed.
- Check transmission case, seals, filter, hoses, lines and cooler for cracks and leaks.
- Inspect transmission breather
- Inspect transmission mounts
- Check transmission oil level, type, and condition.
- Inspect U-joints, yokes, driveshafts, boots/seals, center bearings, and mounting hardware for looseness, damage, and proper phasing
- Inspect axle housing(s) for cracks and leaks
- Inspect axle breather(s)
- Lubricate all drive train grease fittings.
- Check drive axle(s) oil level, type, and condition.
- Change drive axle(s) oil and filter/screen, if applicable; check and clean magnetic plugs.
- Check transmission wiring, connectors, seals, and harnesses for damage and proper routine
- Change transmission oil and filter, if applicable; check and clean magnetic plugs.
- Check interaxle differential lock operation.

Check transmission range shift operation

Frame and Chassis - Suspension and Steering Systems

- Check steering wheel operation for free play and binding.

- Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level.
- Change power steering fluid and filter.
- Inspect steering gear for leaks and secure mounting.
- Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, and linkages.
- Check kingpins for wear.
- Check wheel bearings for looseness and noise.
- Check oil level and condition in all non-drive hubs; check for leaks
- Inspect springs, pins, hangers, shackles, spring U-bolts, and insulators.
- Inspect shock absorbers for leaks and secure mounting
- Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.
- Check and record suspension ride height.
- Lubricate all suspension and steering grease fittings.
- Check axle locating components (radius, torque, and/or track rods).

Frame and Chassis - Tires and Wheels

- Inspect tires for wear patterns and proper mounting.
- Inspect tires for cuts, cracks, bulges, and sidewall damage.
- Inspect valve caps and stems; determine needed action.
- Measure and record tread depth; probe for imbedded debris.
- Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications.
- Check wheel mounting hardware condition; determine needed action.
- Inspect wheels for cracks, damage and proper hand hold alignment.
- Check tire matching (diameter and tread) on single and dual tire applications.

Frame and Chassis - Frame and Fifth Wheel

- Inspect fifth wheel mounting, bolts, air lines, and locks.
- Test operation of fifth wheel locking device; adjust if necessary.
- Check quarter fenders, mud flaps, and brackets
- Check pintle hook assembly and mounting, if applicable.
- Lubricate all fifth wheel grease fittings and plate, of applicable.
- Inspect frame and frame members for cracks and damage.

Hydraulics General System Operation

- Identify system type (closed and open) and verify proper operation
- Read and interpret system diagrams and schematics.
- Understand system temperature, pressure, flow, and cycle time tests; determine needed action.
- Verify placement of equipment /component safety labels and placards; determine needed action.

Pumps

- Identify system fluid type

- Identify causes of pump failure, unusual pump noises, temperature, flow, and leakage problems; determine needed action.
- Determine pump type, rotation, and drive system.
- Identify pump; prime and/or bleed system procedures
- Inspect pump inlet for leaks; determine needed action.
- Inspect pump outlet for leaks; determine needed action.

Filtration/ Reservoirs (Tanks) (Chapter 13)

- Identify type of filtration system; verify filter application and flow direction.
- Service filters and breathers.
- Identify causes of system contamination; determine needed action.
- Take a hydraulic oil sample for analysis.
- Check reservoir fluid level and condition; determine needed action.
- Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines.
- Hoses, Fittings, and Connections
- Inspect hoses and connections (length, size, routing, bend radii, and protection)
- Identify hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination.
- Inspect fitting seals and sealants

Actuators (Chapter 13)

- Identify actuator type (single/double acting, multi-stage/telescopic, and motors).
- Identify the cause of seal failure; determine needed repairs.
- Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs.
- Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action.
- Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures.
- Inspect actuators for dents, cracks, damage, and leakage; determine needed action.

Note: This program can be completed in 6 months. However, students will have online access to this program for a 24-month period.

MICROSOFT OFFICE

- Module Use an integrated software package, specifically the applications included in the Microsoft Office suite
- Demonstrate marketable skills for enhanced employment opportunities
- Describe proper computer techniques for designing and producing various types of documents
- Demonstrate the common commands & techniques used in Windows desktop
- List the meaning of basic PC acronyms like MHz, MB, KB, HD and RAM
- Use WordPad and MSWord to create various types of documents
- Create headings and titles with Word Art
- Create and format spreadsheets, including the use of mathematical formulas
- Demonstrate a working knowledge of computer database functions, including putting, processing, querying and outputting data
- Define computer terminology in definition matching quizzes
- Use the Windows Paint program to alter graphics
- Use a presentation application to create a presentation with both text and graphics
- Copy data from one MS Office application to another application in the suite
- Use e-mail and the Internet to send Word and Excel file attachments
- Demonstrate how to use the Windows Taskbar and Windows Tooltips
- Explain how copyright laws pertain to data and graphics posted on the Internet
- Take the college computer competency test after course completion
- Follow oral and written directions and complete assignments when working under time limitations

Note: Although the Microsoft Office Module is not required to successfully complete this program, students interested in pursuing free Microsoft MOS certification may want to consider completing this Microsoft Office Module at no additional cost.

System Requirements:

Windows Users:

- Windows 8, 7, XP or Vista
- 56K modem or higher
- Soundcard & Speakers
- Firefox, Chrome or Microsoft Internet Explorer

Mac OS User:

- Mac OS X or higher (in classic mode)
- 56K modem or higher
- Soundcard & Speakers
- Apple Safari

iPad Users:

- Due to Flash limitations, eLearning programs are NOT compatible with iPads

Screen Resolution:

- We recommend setting your screen resolution to 1024 x 768 pixels.

Browser Requirements:

- System will support the two latest releases of each browser. When using older versions of a browser, users risk running into problems with the course software.
- Windows Users: Mozilla Firefox, Google Chrome, Microsoft Internet Explorer
- Mac OS Users: Safari, Google Chrome, Mozilla Firefox

Suggested Plug-ins:

- Flash Player
- Real Player
- Adobe Reader
- Java