Florida Department of Education
Curriculum Framework

Program Title: **Diesel Systems Technician 1**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

Career Certificate Program		
Program Number	T650100	
CIP Number	0647061305	
Grade Level	30, 31	
Program Length	1050 hours	
Teacher Certification	Refer to the **Program Structure** section	
CTSO	SkillsUSA	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 9	Communications (Reading and Language Arts): 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Transportation, Distribution and Logistics career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Transportation, Distribution and Logistics career cluster.

The content includes but is not limited to maintaining and repairing diesel engines and electrical systems; reconditioning diesel fuel injection systems; overhauling diesel engines; and performing diesel engine preventive maintenance.

The course content should also include training in communication, leadership, human relations and employability skills; and safe efficient work practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four occupational completion points.

The courses after the core (OCP-A) may be taken in any sequence.

Benchmarks identified with a designation of P-1, P-2, or P-3 are ASE tasks.

When offered at the postsecondary level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3) (b), F.S.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	DIM0101	Diesel Engine Mechanic/Technician Helper	DIESEL MECH @7 7G	150 hours
B	DIM0102	Diesel Electrical and Electronics Technician		300 hours
C	DIM0104	Diesel Engine Technician		300 hours
D	DIM0105	Diesel Brakes Technician		300 hours

National Standards

Industry or National Standards corresponding to the standards and/or benchmarks for the Diesel Systems Technician program can be found using the following link: https://www.aseeducationfoundation.org/program-accreditation

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline, or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social, and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership, and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Proficiently explain and apply required shop and personal safety tasks.
02.0 Identify the basic diesel components and functions.
03.0 Explain and apply required tasks associated with the proper use and handling of tools and equipment.
04.0 Identify principles, assemblies, and systems of engine operation.
05.0 Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.
06.0 Demonstrate workplace employability skills related to personal standards and work habits/ethics.
07.0 Diagnose and repair General electrical systems.
08.0 Diagnose and repair Battery systems.
09.0 Diagnose and repair Starting systems.
10.0 Diagnose and repair Charging systems.
11.0 Diagnose and repair Lighting systems.
12.0 Diagnose and repair Gauges and warning devices.
13.0 Diagnose and repair related electrical systems.
14.0 General engine diagnosis and repair.
15.0 Cylinder head and valve train diagnosis and repair.
16.0 Engine block diagnosis and repair.
17.0 Lubrication systems diagnosis and repair.
18.0 Cooling system diagnosis and repair.
19.0 Air induction and exhaust systems diagnosis and repair.
20.0 Fuel system diagnosis and repair.
21.0 Diagnose and repair engine brakes.
22.0 Diagnose and repair air supply and service systems.
23.0 Diagnose and repair mechanical/foundation air brake systems.
24.0 Diagnose and repair parking brakes.
25.0 Diagnose and repair hydraulic systems.
26.0 Diagnose and repair mechanical/foundation hydraulic brake systems.
27.0 Diagnose and repair power assist units.
28.0 Diagnose and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC).
29.0 Diagnose and repair wheel bearings.

Florida Department of Education
Student Performance Standards

Program Title: **Diesel Systems Technician 1**
Career Certificate Program Number: **T650100**

Course Description: The Diesel Engine Mechanic/Technician Helper course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study shop and personal safety skills, basic diesel components, tools and equipment, occupational safety, engine operation, and workplace employment skills.

ASE = Required Supplemental Tasks

Course Number: DIM0101 **Occupational Completion Point: A** **Diesel Engine Mechanic/Technician Helper – 150 Hours**		**Priority Number**
01.0	Proficiently explain and apply required shop and personal safety tasks. The student will be able to:	
01.01	Identify basic shop organization and management regulations.	
01.02	Identify and apply general and required shop safety rules and procedures.	ASE
01.03	Utilize safe procedures for handling of tools and equipment.	ASE
01.04	Identify and use proper placement of floor jacks and jack stands.	ASE
01.05	Identify and use proper procedures for safe lift operation.	ASE
01.06	Utilize proper ventilation procedures for working within the lab/shop area.	ASE
01.07	Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.	ASE
01.08	Identify the location and use of eye wash stations.	ASE
01.09	Identify and comply with the required use of PPE during lab/shop activities.	ASE
01.10	Secure hair and jewelry for lab/shop activities.	ASE
01.11	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	ASE
01.12	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).	ASE
01.13	Locate and demonstrate knowledge of Safety Data Sheets (SDS).	ASE
01.14	Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.	

	01.15 Identify and comply with personal and environmental safety practices associated with the handling, storage, and disposal of chemicals and hazardous materials.	
02.0	Identify the basic diesel components and functions. The student will be able to:	
	02.01 Identify types of bearings and their uses.	
	02.02 Identify drive power train components and functions.	
	02.03 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility	
03.0	Explain and apply required tasks associated with the proper use and handling of tools and equipment. The student will be able to:	
	03.01 Identify tools and demonstrate their proper usage.	ASE
	03.02 Identify standard and metric designation.	ASE
	03.03 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	ASE
	03.04 Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper, etc.).	ASE
04.0	Identify principles, assemblies, and systems of engine operation. The student will be able to:	
	04.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine	
	04.02 Identify engine assemblies and systems.	
	04.03 Identify the components of and explain the operating principles of two and four-stroke cycle engines.	
	04.04 Identify governor types and their operating principles.	
05.0	Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services. The student will be able to:	
	05.01 Identify information needed and the service requested on a repair order.	ASE
	05.02 Identify purpose and demonstrate proper use of fender covers, mats.	ASE
	05.03 Demonstrate use of the three C's (Concern, Cause, and Correction).	ASE
	05.04 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	ASE
	05.05 Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.)	ASE
06.0	Demonstrate workplace employability skills related to personal standards and work habits/ethics. The student will be able to:	
	06.01 Reports to work daily on time; able to take directions and motivated to accomplish the task at hand.	ASE
	06.02 Dresses appropriately and uses language and manners suitable for the workplace.	ASE
	06.03 Maintains appropriate personal hygiene.	ASE

06.04	Meets and maintains employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc.	ASE
06.05	Demonstrates honesty, integrity and reliability.	ASE
06.06	Complies with workplace policies/laws	ASE
06.07	Contributes to the success of the team, assists others and requests help when needed.	ASE
06.08	Works well with all customers and coworkers.	ASE
06.09	Negotiates solutions to interpersonal and workplace conflicts.	ASE
06.10	Contributes ideas and initiative.	ASE
06.11	Follows directions.	ASE
06.12	Communicates (written and verbal) effectively with customers and coworkers.	ASE
06.13	Reads and interprets workplace documents; writes clearly and concisely.	ASE
06.14	Analyzes and resolves problems that arise in completing assigned tasks.	ASE
06.15	Organizes and implements a productive plan of work.	ASE
06.16	Uses scientific, technical, engineering and mathematics principles and reasoning to accomplish assigned tasks.	ASE
06.17	Identifies and address the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed.	ASE

Course Description: The Diesel Electrical and Electronics Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study general electrical systems, batteries, starting, charging, lighting, gauges, warning devices, and related electrical system diagnostics, service, and repair.

For every task in Diesel Electrical and Electronics Technician, the following safety task must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first task in Diesel Electrical and Electronics Technician is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

EE Task List:
P-1 = 38
P-2 = 15
P-3 = 12
Total 65

Course Number: DIM0102 Occupational Completion Point: B Diesel Electrical and Electronics Technician – 300 Hours		Priority Number
07.0	Diagnose and repair general electrical systems. The student will be able to:	
07.01	Read and interpret electrical/electronic circuits using wiring diagrams.	P-1
07.02	Check continuity in electrical/electronic circuits using appropriate test equipment.	P-1
07.03	Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using appropriate test equipment.	P-1
07.04	Check current flow in electrical/electronic circuits and components using appropriate test equipment.	P-1
07.05	Check resistance in electrical/electronic circuits and components using appropriate test equipment.	P-1
07.06	Locate shorts, grounds, and opens in electrical/electronic circuits.	P-1
07.07	Diagnose parasitic (key-off) battery drain problems; perform tests; determine needed action.	P-1
07.08	Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.	P-1
07.09	Inspect and test spike suppression devices; replace as needed.	P-3
07.10	Check frequency and pulse width signal in electrical/electronic circuits using appropriate test equipment.	P-3
08.0	Diagnose and repair battery systems. The student will be able to:	
08.01	Identify battery type; perform appropriate battery load test; determine needed action.	P-1
08.02	Determine battery state of charge using an open circuit voltage test.	P-1
08.03	Inspect, clean, and service battery; replace as needed.	P-1
08.04	Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.	P-1
08.05	Charge battery using appropriate method for battery type.	P-1
08.06	Inspect, test, and clean battery cables and connectors; repair or replace as needed.	P-1
08.07	Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures.	P-1
08.08	Perform battery capacitance test; determine needed action.	P-2
08.09	Identify and test low voltage disconnect (LVD) systems; determine needed repair.	P-2
09.0	Diagnose and repair starting systems. The student will be able to:	
09.01	Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	P-1
09.02	Inspect and test components (key switch, push button and/or magnetic switch) and wires and harnesses in the starter control circuit; replace as needed	P-2

	09.03 Inspect and test starter relays and solenoids/switches; replace as needed.	P-1
	09.04 Remove and replace starter; inspect flywheel ring gear or flex plate.	P-1
10.0	Diagnose and repair charging systems. The student will be able to:	
	10.01 Test instrument panel mounted volt meters and/or indicator lamps; determine needed action.	P-1
	10.02 Identify causes of a no charge, low charge, or overcharge problems; determine needed action.	P-1
	10.03 Inspect and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.	P-1
	10.04 Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.	P-1
	10.05 Perform charging circuit voltage drop tests; determine needed action.	P-1
	10.06 Remove and replace alternator.	P-1
	10.07 Inspect, repair, or replace cables, wires, and connectors in the charging circuit.	P-1
11.0	Diagnose and repair lighting systems. The student will be able to:	
	11.01 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.	P-1
	11.02 Identify causes of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.	P-1
	11.03 Test, aim, and replace headlights.	P-1
	11.04 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets, and control components/modules; repair or replace as needed.	P-1
	11.05 Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays, and control components/modules of parking, clearance, and taillight circuits; repair or replace as needed.	P-1
	11.06 Inspect and test instrument panel light circuit switches, relays, bulbs/LEDs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed.	P-2
	11.07 Inspect and test interior cab light circuit switches, bulbs/LEDs, sockets, low voltage disconnect (LVD), connectors, terminals, wires, and control components/modules; repair or replace as needed.	P-2
	11.08 Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.	P-1
	11.09 Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, wires and control components/modules; repair or replace as needed.	P-1
	11.10 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 as needed.	P-1
	11.11 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.	P-1
12.0	Diagnose and repair gauges and warning devices. The student will be able to:	

12.01	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.	P-1
12.02	Identify causes of intermittent, high, low, or no gauge readings; determine needed action.	P-2
12.03	Identify causes of data bus-driven gauge malfunctions; determine needed action.	P-3
12.04	Inspect and test gauge circuit sensor/sending units, gauges, connectors, terminals, and wires; repair or replace as needed.	P-2
12.05	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.	P-1
12.06	Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.	P-2
13.0	Diagnose and repair related electrical systems. The student will be able to:	
13.01	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.	P-1
13.02	Identify causes of constant, intermittent, or no horn operation; determine needed action.	P-1
13.03	Inspect and test horn circuit relays, horns, switches, connectors, wires, clock springs, and control components/modules; repair or replace as needed.	P-2
13.04	Identify causes of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action.	P-2
13.05	Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, wires, and control components/modules; repair or replace as needed.	P-2
13.06	Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed.	P-2
13.07	Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed.	P-3
13.08	Inspect and test side view mirror motors, heater circuit grids, relays, switches, connectors, terminals, wires, and control components/modules; repair or replace as needed.	P-3
13.09	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.	P-3
13.10	Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, wires, and control components/modules; repair or replace as needed.	P-3
13.11	Identify causes of slow, intermittent, or no power window operation; determine needed action.	P-3
13.12	Inspect and test motors, switches, relays, connectors, terminals, wires, and control components/modules of power window circuits; repair or replace as needed.	P-3
13.13	Inspect and test block heaters; determine needed repairs.	P-2
13.14	Inspect and test cruise control electrical components; repair or replace as needed.	P-3

13.15	Inspect and test switches, relays, controllers, actuator/solenoids, connectors, terminals, and wires of electric door lock circuits.	P-3
13.16	Inspect and test engine cooling fan electrical control components/modules, wiring; repair or replace as needed.	P-2
13.17	Identify causes of data bus communication problems; determine needed action.	P-2

Course Description: The Diesel Engine Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study engine, cylinder head, valve train, engine block, lubrication, cooling, air induction, exhaust, fuel, and engine brakes diagnostics, service, and repair.

For every task in Diesel Engine Technician, the following safety task must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first task in Diesel Engine Technician is to listen to and verify the operator's concern, review past maintenance, and repair documents, and determine necessary action.

DE Task List:
P-1 = 35
P-2 = 32
P-3 = 21
Total 88

Course Number: DIM0104 Occupational Completion Point: C Diesel Engine Technician – 300 Hours		**Priority Number**
14.0	General engine diagnosis and repair. The student will be able to:	
14.01	Inspect fuel, oil, Diesel Exhaust Fluid (DEF), coolant levels, and condition; determine needed action.	P-1
14.02	Identify and diagnose the causes of engine fuel, oil, coolant, air, and other leaks; determine needed action.	P-1
14.03	Listen and interpret engine noises; determine needed action.	P-3
14.04	Observe engine exhaust smoke color and quantity; determine needed action.	P-2
14.05	Check and diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.	P-1
14.06	Identify and diagnose causes of engine surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action.	P-1
14.07	Identify and diagnose engine vibration problems; determine needed action.	P-2
14.08	Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action.	P-1
14.09	Perform air intake system restriction and leakage tests; determine needed action.	
14.10	Perform intake manifold pressure (boost) test; determine needed action.	

	14.11 Perform exhaust pressure test; determine needed action for DPF.	
	14.12 Perform cylinder contribution test; determine needed action.	
15.0	Cylinder head and valve train diagnosis and repair. The student will be able to:	
	15.01 Inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; determine needed action.	P-2
	15.02 Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action.	P-3
	15.03 Measure valve head height relative to deck, valve face-to-seat contact; determine needed action.	P-3
	15.04 Inspect valve train components; determine needed action.	P-1
	15.05 Reassemble cylinder head.	P-3
	15.06 Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash.	P-3
	15.07 Inspect electronic wiring harness and brackets for wear, bending, cracks, and looseness; determine needed action.	P-1
	15.08 Inspect and adjust valve bridges (crossheads); adjust valve clearances and injector settings.	P-2
	15.09 Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly.	
	15.10 Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action.	
	15.11 Inspect pushrods, rocker arms, rocker arm shafts, and blocked oil passages; perform needed action.	
	15.12 Inspect cam followers; perform needed action.	
16.0	Engine block diagnosis and repair. The student will be able to:	
	16.01 Perform crankcase pressure test; determine needed action	P-1
	16.02 Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components.	P-2
	16.03 Disassemble, clean, and inspect engine block for cracks/damage; measure mating surfaces for warpage; check condition of passages, core/expansion and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability; determine needed action.	P-2
	16.04 Inspect cylinder sleeve counter bore and lower bore; check bore distortion; determine needed action.	P-2
	16.05 Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action.	P-2
	16.06 Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion).	P-2
	16.07 Inspect in-block camshaft bearings for wear and damage; determine needed action.	P-3
	16.08 Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passages; check passage plugs; measure journal diameter; determine needed action.	P-2

	16.09 Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and correct crankshaft end play.	P-2
	16.10 Inspect, install, and time gear train; measure gear backlash; determine needed action.	P-2
	16.11 Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action.	P-3
	16.12 Determine piston-to-cylinder wall clearance; check ring-to-groove fit and end gap; install rings on pistons.	P-3
	16.13 Assemble pistons and connecting rods; install in block; install rod bearings and check clearances.	P-2
	16.14 Check condition of piston cooling jets (nozzles); determine needed action.	P-2
	16.15 Inspect and measure crankshaft vibration damper; determine needed action.	P-3
	16.16 Install and align flywheel housing; inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action.	P-3
	16.17 Inspect flywheel/flex-plate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.	P-2
17.0	Lubrication systems diagnosis and repair. The student will be able to:	
	17.01 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit, test engine oil temperature and check operation of temperature sensor; determine needed action.	P-1
	17.02 Check engine oil level, condition, and consumption; determine needed action.	P-1
	17.03 Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; check drive gear clearances; determine needed action.	P-3
	17.04 Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.	P-3
	17.05 Inspect, clean, and test oil cooler and components; determine needed action.	P-3
	17.06 Inspect turbocharger lubrication system; determine needed action.	P-2
	17.07 Determine proper lubricant and perform oil and filter change.	P-1
18.0	Cooling system diagnosis and repair. The student will be able to:	
	18.01 Check engine coolant type, level, condition, and consumption; test coolant for freeze protection and additive package concentration; determine needed action.	P-1
	18.02 Test coolant temperature and check operation of temperature and level sensors, gauge, and/or sending unit; determine needed action.	P-1
	18.03 Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.	P-2
	18.04 Recover coolant, flush, and refill with recommended coolant/additive package; bleed cooling system.	P-1
	18.05 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed (if equipped).	P-1

	18.06 Inspect water pump and hoses; replace as needed.	P-1
	18.07 Inspect, clean, and pressure test radiator. Pressure test cap, tank(s), and recovery systems; determine needed action.	P-1
	18.08 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.	P-1
	18.09 Inspect turbo charger cooling systems; determine needed action.	P-2
19.0	Air induction and exhaust systems diagnosis and repair. The student will be able to:	
	19.01 Perform air intake system restriction and leakage test; determine needed action.	P-1
	19.02 Perform intake manifold pressure (boost) test; determine needed action.	P-3
	19.03 Check exhaust back pressure; determine needed action.	P-3
	19.04 Inspect turbocharger(s), wastegate, and piping systems; determine needed action.	P-2
	19.05 Inspect turbocharger(s) (variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators.	P-2
	19.06 Check air induction system: piping, hoses, clamps, and mounting; service or replace air filter as needed.	P-1
	19.07 Inspect intake manifold, gaskets, and connections; replace as needed.	P-3
	19.08 Inspect, clean, and test charge air cooler assemblies; replace as needed.	P-2
	19.09 Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed.	P-2
	19.10 Inspect exhaust after treatment devices; determine necessary action.	P-2
	19.11 Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.	P-2
	19.12 Inspect exhaust gas recirculation (EGR) system including EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring; determine needed action.	P-2
20.0	Fuel system diagnosis and repair. The student will be able to:	
	20.01 Fuel supply system	
	• Check fuel level, and condition; determine needed action.	P-1
	• Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.	P-1
	• Inspect, clean, and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware; determine needed action.	P-1
	• Inspect and test pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.	P-1

• Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.	P-1
20.01 Electronic fuel management system	
• Interface with vehicle's on-board computer; perform diagnostic procedures using electronic service tool(s) (to include PC based software and/or data scan tools); determine needed action.	P-1
• Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; clear codes; determine further diagnosis.	P-1
• Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).	P-1
• Inspect and replace electrical connector terminals, seals, and locks.	P-1
• Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed.	P-1
• Using electronic service tool(s) access and interpret customer programmable parameters.	P-1
• Perform on-engine inspections, test and adjustments on electronic unit injectors (EUI); determine needed action	P-2
• Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable).	P-2
• Perform cylinder contribution test utilizing electronic service tool(s).	P-1
• Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action.	P-2
• Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI) high pressure oil supply and control systems; determine needed action.	P-2
• Perform on-engine inspections and tests on high pressure common rail (HPCR) type injection systems; determine needed action.	P-2
• Inspect high pressure injection lines, hold downs, fittings and seals; determine needed action.	P-2
21.0 Diagnose and repair engine brakes. The student will be able to:	
21.01 Inspect and adjust engine compression/exhaust brakes; determine needed action.	P-2
21.02 Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; determine needed action.	P-3
21.03 Inspect engine compression/exhaust brake housing, valves, seals, lines, and fittings; repair or replace as needed.	P-3

Course Description: The Diesel Brakes Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of air, and hydraulic brakes.

For every task in Diesel Brakes Technician, the following safety task must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand protection; proper lifting practices; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of fuels/chemicals/materials in accordance with federal, state, and local regulations.

The first task in Diesel Brakes Technician is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.

BR Task List:	
P-1 =	39
P-2 =	9
P-3 =	7
Total	55

Course Number: DIM0105 Occupational Completion Point: D Diesel Brakes Technician – 300 Hours		Priority Number
22.0	Diagnose and repair air supply and service systems. The student will be able to:	
22.01	Identify and diagnose poor stopping, air leaks, premature wear, pulling, grabbing, dragging, or balance problems caused by supply and service system malfunctions; determine needed action.	P-1
22.02	Check air system build-up time; determine needed action.	P-1
22.03	Drain air reservoir/tanks; check for oil, water, and foreign material; determine needed action.	P-1
22.04	Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.	P-1
22.05	Inspect and test air system pressure controls: governor, unloader assembly valves, filters, lines, hoses, and fittings; replace as needed.	P-1
22.06	Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed.	P-1
22.07	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.	P-1
22.08	Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed.	P-1
22.09	Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; replace as needed.	P-1
22.10	Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed.	P-1
22.11	Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.	P-1
22.12	Inspect and test brake relay valve; replace as needed.	P-1
22.13	Inspect and test quick release valves; replace as needed.	P-1
22.14	Inspect and test tractor protection valve; replace as needed.	P-1
22.15	Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed. (as applicable)	P-1
22.16	Inspect and test low pressure warning devices, wiring, and connectors; repair or replace as needed.	P-1

	22.17 Inspect and test air pressure gauges, lines, and fittings; replace as needed.	P-2
23.0	Diagnose and repair mechanical/foundation air brake systems. The student will be able to:	
	23.01 Identify and diagnose 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.	P-1
	23.02 Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed.	P-1
	23.03 Identify type, inspect and service slack adjusters; perform needed action.	P-1
	23.04 Inspect camshafts, tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; replace as needed.	P-1
	23.05 Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs.	P-2
	23.06 Inspect and measure brake shoes or pads; perform needed action.	P-1
	23.07 Inspect and measure brake drums or rotors; perform needed action.	P-1
24.0	Diagnose and repair parking brakes. The student will be able to**:**	
	24.01 Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.	P-1
	24.02 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed.	P-1
	24.03 Inspect and test parking (spring) brake application and release valve; replace as needed.	P-1
	24.04 Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations.	P-1
	24.05 Identify and test anti compounding brake function.	P-1
25.0	Diagnose and repair hydraulic systems. The student will be able to:	
	25.01 Identify and diagnose poor stopping, premature wear, pulling, dragging, balance, or pedal feel problems caused by the hydraulic system; determine needed action.	P-2
	25.02 Inspect and test master cylinder for internal/external leaks and damage; replace as needed.	P-1
	25.03 Inspect hydraulic system brake lines for leaks and damage, flexible hoses, and fittings for leaks and damage; replace as needed.	P-1
	25.04 Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed.	P-3
	25.05 Inspect and test brake pressure differential valve and warning light circuit switch, bulbs/LEDs, wiring, and connectors; repair or replace as needed.	P-2
	25.06 Inspect disc brake caliper assemblies; replace as needed.	P-1
	25.07 Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type.	P-1
	25.08 Inspect and clean wheel cylinders; replace as needed.	

	25.09 Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed.	
26.0	Diagnose and repair mechanical/foundation hydraulic brake systems. The student will be able to:	
	26.01 Identify and diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems caused by mechanical components; determine needed action.	P-2
	26.02 Inspect and measure rotors; perform needed action.	P-1
	26.03 Inspect and measure disc brake pads; inspect mounting hardware; perform needed action.	P-1
	26.04 Check parking brake operation; inspect parking brake application and holding devices; adjust and replace as needed.	P-2
	26.05 Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action.	
27.0	Diagnose and repair power assist units. The student will be able to:	
	27.01 Identify and diagnose stopping problems caused by the brake assist (booster) system; determine needed action.	P-3
	27.02 Inspect, test, repair, or replace hydraulic brake assist (booster), hoses, and control valves; determine proper fluid type.	P-3
	27.03 Check emergency (back-up, reserve) brake assist system.	P-3
28.0	Diagnose and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC). The student will be able to:	
	28.01 Observe antilock brake system (ABS) warning light operation (includes trailer and dash mounted ABS warning light); determine needed action.	P-1
	28.02 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or electronic service tool(s); determine needed action.	P-1
	28.03 Identify poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action.	P-1
	28.04 Test and check operation of antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action.	P-1
	28.05 Test antilock brake system (ABS) wheel speed sensors and circuits; adjust or replace as needed.	P-1
	28.06 Bleed the ABS hydraulic circuits according to manufacturers' procedures.	P-2
	28.07 Observe automatic traction control (ATC) warning light operation; determine needed action.	P-3
	28.08 Diagnose automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action.	P-3
	28.09 Verify power line carrier (PLC) operations.	P-2
	28.10 Diagnose, service, and adjust antilock brake system (ABS) wheel speed sensors and circuits following manufacturers' recommended procedures (including voltage output, resistance, shorts to voltage/ground, and frequency data).	

29.0	Diagnose and repair wheel bearings. The student will be able to:	
	29.01 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.	P-1
	29.02 Identify, inspect or replace unitized/preset hub bearing assemblies.	P-2

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Benchmarks identified with a designation of P-1, P-2, or P-3 are ASE tasks.

The safety guidelines in the student performance standards have been recommended in the ASE Program Certification Standards for Medium/Heavy Truck Technician Training Program administered by Automotive Service Excellence (ASE) Education Foundation.

Career and Technical Student Organization (CTSO)

SkillsUSA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In Career Certificate Programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Computation (Mathematics) and Communications (Language and Reading 9). These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02, Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01, F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College System Institution must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91, F.S.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.