

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Service Management Technology  
**Career Cluster:** Transportation, Distribution and Logistics

	AS	AAS
CIP Number	1615080300	0615080300
Program Type	College Credit	College Credit
Standard Length	68 Credits	68 Credits
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3020, 49-3023	49-3020, 49-3023
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	

### 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 instruction in diagnosis of malfunctions in the repair of engines, fuel, electrical, cooling and brake systems; drive train and suspension systems; radiators; transmissions and carburetors; basic management concepts; troubleshooting skills; and servicing, maintaining and repairing all mechanical systems or gasoline and diesel powered automobiles including fuel, electrical, cooling, brake, drive, suspension and related systems. The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices. This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive Service industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### Program Structure

This program is a planned sequence of instruction consisting of 68 credit hours.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

Student performance standards required for National Institute for Automotive Service Excellence (ASE) certification are identified with the initials ASE following the standard.

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

The following PSAV programs articulate credit into this degree program. These statewide articulation agreements have been approved by the Articulation Coordinating Committee.

Automotive Service Technology (I470608/0647060405) –19 credits  
Automotive Service Technology 1 (T400700/0647060411) **and**  
Automotive Service Technology 2 (T400800/0647060412) – 19 Credits

The following industry certifications articulate credit into this degree program. These statewide articulation agreements have been approved by the Articulation Coordinating Committee.

Automobile/Light Truck Certifications A1 – A8, awarded by the National Institute for Automotive Service Excellence (ASE), articulate three (3) credits each to the Automotive Service Management Technology (AS 1615080300 / AAS 0615080300) degree.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 68 credit hours according to Rule 6A-14.030, F.A.C.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS/AAS degree program does not include a College Credit Certificate.

### **Standards**

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

- 01.0 Demonstrate an understanding of automotive mechanics.
- 02.0 Apply electrical and electronic skills in diagnosing/troubleshooting malfunctions of electrical/electronic components.
- 03.0 Demonstrate proficiency in servicing steering, suspension and wheel systems.
- 04.0 Demonstrate proficiency in servicing automotive brake systems.
- 05.0 Demonstrate proficiency in servicing cooling, air conditioning and heating services.
- 06.0 Demonstrate proficiency in engine performance service.
- 07.0 Demonstrate proficiency in automatic transmission/trans-axle service.
- 08.0 Demonstrate proficiency in servicing manual drive trains and axles.
- 09.0 Demonstrate proficiency in engine repair service.
- 10.0 Demonstrate proficiency in management skills.
- 11.0 Demonstrate appropriate communication skills.
- 12.0 Demonstrate appropriate math skills.
- 13.0 Demonstrate appropriate understanding of basic science.
- 14.0 Demonstrate employability skills.
- 15.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Automotive Service Management Technology  
**CIP Numbers:** 1615.080300 A.S./0615.080300 A.A.S.  
**Program Length:** 68 Credit Hours  
**SOC Code(s):** 49-3020, 49-3023

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Demonstrate an understanding of automotive mechanics--The student will be able to:

- 01.01 Apply shop safety rules and procedures.
- 01.02 Use and maintain hand tools such as screwdrivers, special application pliers, hammers, chisels, punches, special application wrenches and sockets, files, hacksaws, bench vises and "C" clamps.
- 01.03 Demonstrate use of precision measuring tools.
- 01.04 Use and install fasteners such as screws and bolts, key screw extractors, helicoil inserts and thread cutting taps and dies.
- 01.05 Use and maintain power tools such as drills, bench grinders, drill press, hydraulic presses, impact wrenches, air chisels, parts washers, hydraulic jacks and vehicle hoists.
- 01.06 Apply basic math skills.
- 01.07 Use and apply metric and English measurement skills.
- 01.08 Demonstrate an understanding of lubrication requirements.
- 01.09 Inspect, remove, replace and adjust all belts.
- 01.10 Perform auto safety inspection.
- 01.11 Demonstrate use of technical manuals, specification handbooks and charts.
- 01.12 Demonstrate an understanding of steering geometry and suspension geometry such as caster, camber, toe-in, king pin inclination (steering axis) and toe-in and toe-out on turns.
- 01.13 Demonstrate an understanding of the function of steering and suspension system components such as coil springs, leaf springs, torsion bars, twin "I" beams, quadralink, rubber bushings, shock absorbers, tie rods, ball joints, shackles, idler arm, pitman arm and control arm.
- 01.14 Demonstrate an understanding of manual and power steering operation such as power steering pump, power steering control valve and power steering fluid leaks.
- 01.15 Demonstrate an understanding of drum brake operation such as adjusters, wheel cylinder, pull, grab, chatter, noise, pulsations, fade and lining conditions.
- 01.16 Demonstrate an understanding of disc brake operation such as caliper, piston, pull, grab, chatter, pulsations, fade and lining conditions.
- 01.17 Demonstrate an understanding of brake system valve operation such as pressure differential valve, proportional valve, metering valve and brake warning light.
- 01.18 Demonstrate an understanding of basic heating and cooling systems.
- 01.19 Demonstrate an understanding of basic air conditioning systems.

- 01.20 Demonstrate knowledge of engine components.
  - 01.21 Demonstrate an understanding of basic ignition and fuel systems.
  - 01.22 Demonstrate an understanding of rear axle operation such as differential action; limited slip mechanisms; floating, nonfloating and semi-floating.
  - 01.23 Demonstrate an understanding of drive shaft operation, drive shaft construction and universal joint operation such as single joint, constant velocity, joint working angle, joint phasing, slip joint, spline output and spline drive shaft.
  - 01.24 Demonstrate an understanding of automatic transmission operation such as fluid coupling, torque converter, planetary gear system, power flow, hydraulic system, lubricant and cooling.
  - 01.25 Demonstrate an understanding of clutch operation.
  - 01.26 Demonstrate an understanding of clutch release mechanisms to include linkage and hydraulic.
  - 01.27 Demonstrate an understanding of manual transmission operation such as torque multiplication, power flow, sliding gears, constant mesh gear, synchronizer action and shift mechanisms.
  - 01.28 Demonstrate an understanding of overdrive operation.
  - 01.29 Demonstrate knowledge of internal engine components.
  - 01.30 Describe electrical terms, magnetism, electrical current flow and Ohm's law.
  - 01.31 Demonstrate an understanding of series circuits.
  - 01.32 Demonstrate an understanding of parallel circuits.
  - 01.33 Demonstrate an understanding of series-parallel circuits.
  - 01.34 Apply basic welding skills related to the automobile industry.
  - 01.35 Demonstrate an understanding of advanced electronics concepts.
  - 01.36 Demonstrate an understanding of electronic schematic diagrams and diagnostic techniques.
  - 01.37 Demonstrate an understanding of electrical/electronic wire repair procedures.
  - 01.38 Demonstrate an understanding of electronic semiconductor concepts and components.
  - 01.39 Demonstrate an understanding of electronic transistor concepts and components.
  - 01.40 Demonstrate an understanding of electronic microprocessor concepts, functions and components.
  - 01.41 Adjust door hinges and striker plates.
  - 01.42 Locate and correct rattles and noises.
  - 01.43 Install door moldings.
  - 01.44 Remove and replace electric window regulators.
  - 01.45 Adjust electric window regulators.
  - 01.46 Install air shocks.
  - 01.47 Install C.B.'s and radios.
  - 01.48 Touch up paint.
  - 01.49 Lubricate hinges.
  - 01.50 Adjust headlights. (ASE)
  - 01.51 Inspect and replace passenger restraints.
  - 01.52 Check vehicle visibility.
  - 01.53 Check and adjust specified fluid levels.
- 02.0 Apply electrical and electronic skills in diagnosing/troubleshooting malfunctions of electrical/electronic components--The student will be able to:
- 02.01 Use and apply basic electrical and electronic test equipment and meters.

- 02.02 Perform power checks with test lights.
  - 02.03 Perform continuity tests.
  - 02.04 Measure voltage drop, current flow and resistance in a circuit or component with a multimeter. (ASE)
  - 02.05 Locate an open circuit and a short circuit.
  - 02.06 Analyze cranking system malfunctions.
  - 02.07 Analyze charging system malfunctions. (ASE)
  - 02.08 Service and test batteries.
  - 02.09 Remove and replace light bulbs. (ASE)
  - 02.10 Test, remove and replace fuses and circuit breakers. (ASE)
  - 02.11 Replace and test starters. (ASE)
  - 02.12 Test and replace alternators.
  - 02.13 Test, remove and replace regulators. (ASE)
  - 02.14 Inspect and repair lighting systems. (ASE)
  - 02.15 Diagnose, repair or replace turn signal and stoplight switches. (ASE)
  - 02.16 Test and replace electrical system switches. (ASE)
  - 02.17 Diagnose, repair or replace power window and power seat systems, including motors.
  - 02.18 Diagnose and service windshield wiper/washer systems. (ASE)
  - 02.19 Test and replace sending units. (ASE)
  - 02.20 Diagnose engine malfunctions.
  - 02.21 Inspect, remove and replace alternator belts.
  - 02.22 Overhaul starters. (ASE)
  - 02.23 Diagnose, repair or replace horn systems. (ASE)
  - 02.24 Diagnose, repair or replace clock systems.
  - 02.25 Diagnose, repair or replace warning buzzer.
  - 02.26 Test and replace instrument panel units. (ASE)
  - 02.27 Diagnose and service cruise control systems. (ASE)
  - 02.28 Check, remove and replace radios. (ASE)
  - 02.29 Test and repair automotive alarm system components. (ASE)
- 03.0 Demonstrate proficiency in servicing steering, suspension and wheel systems--The student will be able to:
- 03.01 Diagnose suspension problems.
  - 03.02 Diagnose wheel/tire vibrations, shimmy and tramp.
  - 03.03 Diagnose steering problems.
  - 03.04 Lubricate suspension, steering gear and linkage. (ASE)
  - 03.05 Check manual steering gear fluid level. (ASE)
  - 03.06 Inspect steering systems. (ASE)
  - 03.07 Inspect suspension systems. (ASE)
  - 03.08 Inspect and test shock absorbers.
  - 03.09 Check power steering fluid level. (ASE)
  - 03.10 Inspect, repair and replace tires and wheels.
  - 03.11 Rotate wheels and tires. (ASE)
  - 03.12 Balance wheels, (ASE)
  - 03.13 Service wheel bearings and grease seals on nondrive axles/spindles. (ASE)
  - 03.14 Remove and replace spindles and ball joints. (ASE)
  - 03.15 Remove and replace shock absorbers and mountings. (ASE)
  - 03.16 Measure and adjust torsion bar height. (ASE)
  - 03.17 Remove and replace coil springs/torsion bars. (ASE)

- 03.18 Remove and replace control arms and bushings. (ASE)
- 03.19 Remove and replace steering linkage components.
- 03.20 Remove and replace steering dampers. (ASE)
- 03.21 Remove and replace steering dampers. (ASE)
- 03.22 Remove and replace manual/power steering gear assemblies.
- 03.23 Check two-wheel alignment.
- 03.24 Rebuild MacPherson type struts. (ASE)
- 03.25 Overhaul recirculating ball manual gears.
- 03.26 Rebuild rack-and-pinion manual gears. (ASE)
- 03.27 Remove and replace power steering pumps. (ASE)
- 03.28 Rebuild power steering pumps.
- 03.29 Overhaul integral steering gears.
- 03.30 Rebuild rack-and-pinion power steering assembly. (ASE)
- 03.31 Check four-wheel alignment.

04.0 Demonstrate proficiency in servicing automotive brake systems—The student will be able to:

- 04.01 Diagnose brake system problems.
- 04.02 Diagnose combination valve malfunctions.
- 04.03 Perform operational inspections.
- 04.04 Inspect brake assemblies.
- 04.05 Remove and replace calipers and rotors. (ASE)
- 04.06 Refinish rotors. (ASE)
- 04.07 Rebuild calipers. (ASE)
- 04.08 Refinish brake drums. (ASE)
- 04.09 Replace drum brake shoes and disc pads. (ASE)
- 04.10 Identify anti-locking braking systems (ABS) principle and components.
- 04.11 Inspect and replace brake lines and hoses. (ASE)
- 04.12 Adjust brake shoes. (ASE)
- 04.13 Adjust parking brakes. (ASE)
- 04.14 Rebuild wheel cylinders. (ASE)
- 04.15 Remove and replace wheel cylinders, (ASE)
- 04.16 Bleed hydraulic brakes. (ASE)
- 04.17 Repair or replace parking brake cables and linkage. (ASE)
- 04.18 Remove and replace master cylinders. (ASE)
- 04.19 Remove and replace hydraulic power cylinders.
- 04.20 Flush brake systems. (ASE)
- 04.21 Service and repair power assist and brake control systems.
- 04.22 Service and repair front and rear disc brakes.
- 04.23 Replace hydraulic brake boosters. (ASE)
- 04.24 Inspect, diagnose and repair anti-locking brake systems.

05.0 Demonstrate proficiency in servicing cooling, air conditioning and heating systems--The student will be able to:

- 05.01 Diagnose overheating problems.
- 05.02 Check radiator coolant level.
- 05.03 Test and add coolant. (ASE)
- 05.04 Pressure test cooling systems.(ASE)
- 05.05 Test radiator caps. (ASE)

- 05.06 Inspect, remove and replace radiator and heater hoses. (ASE)
- 05.07 Remove, test and replace thermostats. (ASE)
- 05.08 Flush cooling systems and replace coolant.
- 05.09 Remove and replace radiators. (ASE)
- 05.10 Remove and replace water pumps.
- 05.11 Diagnose basic air conditioning system problems.
- 05.12 Inspect and pressure test basic air conditioning systems.
- 05.13 Inspect and pressure test basic air conditioning systems.
- 05.14 Discharge, evacuate and charge basic air conditioning systems. (ASE)
- 05.15 Leak test basic air conditioning systems. (ASE)
- 05.16 Service air conditioning electrical circuits.
- 05.17 Service vacuum circuits.
- 05.18 Remove and replace components in basic air conditioning systems. (ASE)
- 05.19 Remove and replace engine fan clutches and electric cooling fan and controls.
- 05.20 Remove and replace blower motors. (ASE)
- 05.21 Remove and replace heater cores, control units and cables. (ASE)
- 05.22 Diagnose and repair electronic air conditioning controls.
- 05.23 Remove and replace air conditioning compressor shaft seals.

06.0 Demonstrate proficiency in engine performance service--The student will be able to:

- 06.01 Analyze engine performance.
- 06.02 Perform running cylinder balance tests.
- 06.03 Perform cylinder compression tests.
- 06.04 Check the performance of engines equipped with on-board computers.
- 06.05 Inspect, remove and replace points and condensers. (ASE)
- 06.06 Remove and replace distributor. (ASE)
- 06.07 Check the distributor advance in a vehicle.
- 06.08 Remove distributor; inspect, test and service.
- 06.09 Inspect and test primary circuits.
- 06.10 Remove and replace coils.
- 06.11 Remove and replace ignition switches and resistors.
- 06.12 Inspect, remove and replace ignition wires, caps and rotors.
- 06.13 Remove, gap and replace spark plugs. (ASE)
- 06.14 Service electronic ignition systems.
- 06.15 Service air cleaners. (ASE)
- 06.16 Inspect, remove and replace fuel filters. (ASE)
- 06.17 Measure fuel flow and pressure.
- 06.18 Remove and replace fuel lines. (ASE)
- 06.19 Remove and replace fuel pumps. (ASE)
- 06.20 Adjust idle speed.
- 06.21 Clean and adjust chokes. (ASE)
- 06.22 Inspect, remove and replace manifold control valves.
- 06.23 Remove and replace fuel injection system filters.
- 06.24 Set idle speed to specifications.
- 06.25 Remove and replace fuel injectors. (ASE)
- 06.26 Service throttle body fuel injection systems.
- 06.27 Service ported fuel injection systems.
- 06.28 Service positive crankcase ventilation (PCV) systems. (ASE)
- 06.29 Service evaporative control systems. (ASE)
- 06.30 Service thermostatic air cleaners. (ASE)



- 06.31 Service air-injection systems. (ASE)
- 06.32 Service exhaust gas recirculation (EGR) systems. (ASE)
- 06.33 Inspect, remove and replace catalytic converter. (ASE)
- 06.34 Diagnose mechanical, ignition and fuel emission problems.
- 06.35 Inspect, remove and replace exhaust system components. (ASE)
- 06.36 Inspect, remove and replace catalytic converters. (ASE)
- 06.37 Perform cylinder leakage tests.
- 06.38 Diagnose and correct malfunctions in computer control systems.
- 06.39 Diagnose, test and replace on-board computer controls.
- 06.40 Diagnose, service and replace computerized sensors.
- 06.41 Clean and overhaul electronically controlled carburetor systems. (ASE)
- 06.42 Remove and replace turbo chargers. (ASE)
- 06.43 Rebuild fuel injection pump. (ASE)
- 06.44 Check and adjust turbo charger waste gates. (ASE)
- 06.45 Test exhaust emissions using a four gas analyzer.
- 06.46 Service diesel injectors.
- 06.47 Remove and replace diesel engine fuel filters.
- 06.48 Check and adjust injection pump timing.
- 06.49 Remove and replace injection pumps.
- 06.50 Check and adjust idle and maximum speeds.
- 06.51 Test and service preheating systems.

07.0 Demonstrate proficiency in automatic transmission/trans-axle service--The student will be able to:

- 07.01 Performance test automatic transmissions.
- 07.02 Change transmission oil and filter. (ASE)
- 07.03 Adjust linkage from the engine.
- 07.04 Adjust shift linkage. (ASE)
- 07.05 Adjust neutral safety switches.
- 07.06 Remove and replace external gaskets and seals.
- 07.07 Test vacuum shift modulator. (ASE)
- 07.08 Adjust bands. (ASE)
- 07.09 Pressure flush transmission cooler assemblies.
- 07.10 Diagnose malfunctions of automatic transmissions such as fluid leaks, fluid condition, slipping, lock up and shift problems.
- 07.11 Diagnose, repair and replace trans-axles.
- 07.12 Pressure test transmissions in vehicles. (ASE)
- 07.13 Test the electrical controls of an automatic clutch converter.
- 07.14 Service governors.
- 07.15 Service valve bodies.
- 07.16 Rebuild transmission assemblies (ASE)
- 07.17 Rebuild automatic trans-axle.
- 07.18 Pressure flush converter assemblies.
- 07.19 Remove and replace extension housings and bushings.

08.0 Demonstrate proficiency in servicing manual drive trains and axles--The student will be able to:

- 08.01 Diagnose drive line problems.
- 08.02 Diagnose and performance test manual transmission problems.

- 08.03 Inspect drive shafts, universal joints and center bearings.
- 08.04 Lubricate universal joints. (ASE)
- 08.05 Remove and replace transmission mounts. (ASE)
- 08.06 Remove and replace transmissions.
- 08.07 Adjust shift linkage. (ASE)
- 08.08 Adjust clutches. (ASE)
- 08.09 Remove and replace extension housing seals and bushings. (ASE)
- 08.10 Remove and replace clutches, release bearings, linkage and pilot bearings.
- 08.11 Rebuild or replace clutch master and slave cylinders. (ASE)
- 08.12 Remove and replace universal joints. (ASE)
- 08.13 Remove and replace speedometer gears and service speedometer cables.(ASE)
- 08.14 Remove and replace drive axle bearings and seals. (ASE)
- 08.15 Service and repair differentials. (ASE)
- 08.16 Remove and replace trans-axle assemblies.
- 08.17 Adjust trans-axle shifting controls.
- 08.18 Inspect, remove, replace and lubricate front drive axle flexible joints and boots.
- 08.19 Inspect, remove and replace constant-velocity universal joints.
- 08.20 Service manual transmissions to include overdrives. (ASE)
- 08.21 Overhaul trans-axle assemblies. (ASE)

09.0 Demonstrate proficiency in engine repair service--The student will be able to:

- 09.01 Clean engines. (ASE)
- 09.02 Remove and replace motor mounts.
- 09.03 Check valve guides for wear.
- 09.04 Reface valves and seats.
- 09.05 Perform cylinder balance tests.
- 09.06 Perform cylinder compression tests.
- 09.07 Perform cylinder leakage tests. (ASE)
- 09.08 Determine source(s) of oil/coolant loss.
- 09.09 Determine source(s) of excess noise. (ASE)
- 09.10 Determine cause(s) of overheating. (ASE)
- 09.11 Check the engine oil pressure.
- 09.12 Remove and replace core plugs. (ASE)
- 09.13 Inspect, remove and replace flywheels and ring gears.
- 09.14 Remove and replace engine assemblies. (ASE)
- 09.15 Remove and replace oil pans. (ASE)
- 09.16 Remove and replace oil pumps.
- 09.17 Clean cylinder blocks, oil passages and pistons.
- 09.18 Inspect blocks for warpage. (ASE)
- 09.19 Measure and inspect engine components for proper tolerances.
- 09.20 Remove and replace crankshafts, mains and rod bearings. (ASE)
- 09.21 Remove and replace camshafts and bushings. (ASE)
- 09.22 Remove and replace pistons and rings. (ASE)
- 09.23 Remove ridges and deglaze cylinder walls.
- 09.24 Remove and replace front and rear oil seals.
- 09.25 Remove and replace intake and exhaust manifolds. (ASE)
- 09.26 Remove, clean, inspect and replace cylinder heads; and inspect heads for cracks and warpage.(ASE)
- 09.27 Test and replace hydraulic lifters.
- 09.28 Remove and replace timing chains, belts and gears. (ASE)

- 09.29 Test valve springs. (ASE)
- 09.30 Adjust valve lifters. (ASE)
- 09.31 Replace rocker arm assemblies. (ASE)
- 09.32 Change oil and oil filters.

10.0 Demonstrate proficiency in management skills--The student will be able to:

- 10.01 Write and process work orders.
- 10.02 Process parts warranties and labor claims.
- 10.03 Process merchandise returns.
- 10.04 Accept and return cores/cards for rebuilt and exchange items.
- 10.05 Select and care for shop materials.
- 10.06 Use supervisory techniques for hiring and firing.
- 10.07 Prepare technical reports.
- 10.08 Perform business and technical computations.
- 10.09 Evaluate productivity.
- 10.10 Develop a customer relations plan.
- 10.11 Plan service facilities.
- 10.12 Schedule production.
- 10.13 Plan, organize, activate and control a service operation.
- 10.14 Perform auto safety inspections.

11.0 Demonstrate appropriate communication skills--The student will be able to:

- 11.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
- 11.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 11.03 Read and follow written and oral instructions.
- 11.04 Answer and ask questions coherently and concisely.
- 11.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 11.06 Demonstrate appropriate telephone/communication skills.

12.0 Demonstrate appropriate math skills--The student will be able to:

- 12.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 12.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 12.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 12.04 Determine the correct purchase price, to include sales tax for a materials list
- 12.05 Demonstrate an understanding of federal, state and local taxes and their computation.

13.0 Demonstrate appropriate understanding of basic science--The student will be able to:

- 13.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 13.02 Draw conclusions or make inferences from data.

13.03 Identify health related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.

13.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

14.0 Demonstrate employability skills--The student will be able to:

14.01 Conduct a job search.

14.02 Secure information about a job.

14.03 Identify documents which may be required when applying for job interview.

14.04 Complete a job application form correctly.

14.05 Demonstrate competence in job interview techniques.

14.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.

14.07 Identify and adopt acceptable work habits.

14.08 Demonstrate knowledge of how to make appropriate job changes.

14.09 Demonstrate acceptable employee health habits.

14.10 Demonstrate knowledge of the "Federal Right-To-Know Law" as recorded in 29 CFR-1910, 1200.

15.0 Demonstrate an understanding of entrepreneurship--The student will be able to:

15.01 Define entrepreneurship.

15.02 Describe the importance of entrepreneurship to the American economy.

15.03 List the advantages and disadvantages of business ownership.

15.04 Identify the risks involved in ownership of a business.

15.05 Identify the necessary personal characteristics of a successful entrepreneur.

15.06 Identify the business skills needed to operate a small business efficiently and effectively.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Engineering, Management & Seamanship  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>AS</b>	<b>AAS</b>
CIP Number	1615080400	0615080400
Program Type	College Credit	College Credit
Standard Length	66 Credits	66 Credits
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3051	49-3051
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fl DOE.org/workforce/perkins/perkins_resources.asp">http://www.fl DOE.org/workforce/perkins/perkins_resources.asp</a>	

### **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 installation and operation of diesel and gasoline engines; troubleshooting for diesel and gasoline engines; engine maintenance; propeller selection; corrosion control; and fiberglass hull repair.

### **Program Structure**

This program is a planned sequence of instruction consisting of 66 credit hours.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

No PSAV programs articulate credit into this degree program.

No industry certifications articulate credit into this degree program.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 66 credit hours according to Rule 6A-14.030, F.A.C.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for

entry into employment (Rule 6A-14.030, F.A.C.). This AS/AAS degree program includes the following College Credit Certificates:

Marine Technology (0615080401) -34 Credit Hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

### **Standards**

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

- 01.0 Perform basic shop practices.
- 02.0 Describe operational theory of (2) two and (4) four cycle engines - Diesel and Gasoline.
- 03.0 Use service manuals and parts references.
- 04.0 Perform basic welding skills.
- 05.0 Remove and install engines.
- 06.0 Recondition and service engines.
- 07.0 Perform diagnosis service and repairs to all types of marine ignition systems.
- 08.0 Develop skills in electrical-electronic theory of operation and application.
- 09.0 Troubleshoot and repair fuel systems.
- 10.0 Service cooling systems.
- 11.0 Service exhaust systems.
- 12.0 Demonstrate shop management functions.
- 13.0 Identify special marine principles.
- 14.0 Repair inboard drive systems.
- 15.0 Rig boats.
- 16.0 Repair lower units.
- 17.0 Perform corrosion experiments and understand corrosion control.
- 18.0 Apply fiberglass construction and maintenance procedures.
- 19.0 Demonstrate appropriate communication skills.
- 20.0 Demonstrate appropriate math skills.
- 21.0 Demonstrate appropriate understanding of basic science.
- 22.0 Demonstrate and practice employability skills.
- 23.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Marine Engineering, Management & Seamanship  
**CIP Numbers:** 1615.080400 A.S. / 0615.080400 A.A.S.  
**Program Length:** 66 Credit Hours  
**SOC Code(s):** 49-3051

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Perform basic shop practices--The student will be able to:

- 01.01 Perform calculations using decimals and fractions to include subtraction, multiplication and division.
- 01.02 Change fractions to decimals and decimals to fractions.
- 01.03 Determine metric system measurements.
- 01.04 Comply with safety rules and regulations.
- 01.05 Operate hand tools safely and properly.
- 01.06 Set up and use power tools safely and properly.
- 01.07 Set up and use precision measuring tools.
- 01.08 Drill and remove broken studs and install helicoils.
- 01.09 Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility.
- 01.10 Install fasteners such as screws, bolts and keys; and utilize screw extractor, thread cutting tape and dies.
- 01.11 Locate and match electrical units by their symbols on a wiring diagram.
- 01.12 Draw performance charts and graphs on propeller selection and engine specifications.

02.0 Describe operational theory of (2) two and (4) four cycle engines diesel and gasoline--  
The student will be able to:

- 02.01 Distinguish between the characteristics of four-stroke cycle engine including diesel engines.
- 02.02 Identify basic engine parts.
- 02.03 Describe the functions of the crankshaft.
- 02.04 List the information which may be found on the engine nameplate.
- 02.05 Describe types of motion and simple machines and characteristics of energy.
- 02.06 Calculate problems using the formula for work, horsepower and torque.
- 02.07 Describe the main theoretical concept of heat engines.
- 02.08 Describe the process by which an internal combustion engine converts chemical energy into rotary motion.
- 02.09 Calculate problems using the formulas for engine cubic displacement and compression ratio.
- 02.10 Describe the principles of operation of four-and two-stroke cycle engines.
- 02.11 Identify the parts of a camshaft lobe-crankshaft lobe.
- 02.12 Describe valve timing and overlap procedures.



- 02.13 Identify types of valve arrangements.
- 02.14 Identify types of engine construction.
- 02.15 Describe piston engine operation, design loop charged.
- 02.16 Describe the operation of two- and four-stroke cycle engines to include diesel engines.
- 02.17 Distinguish different engine design by manufacturers.
- 02.18 Identify marine engine makeup and conversion from auto engines.

03.0 USE SERVICE MANUALS AND PARTS REFERENCES--The student will be able to:

- 03.01 Demonstrate use of multiple and single type shop service manual.
- 03.02 Demonstrate use of specification handbooks and tune up charts.
- 03.03 Demonstrate use of manufacturer parts catalogs.
- 03.04 Demonstrate use of microfiche.
- 03.05 Demonstrate use of marine engine installation manuals.
- 03.06 Demonstrate use of flat rate and service bulletins.

04.0 Perform basic welding skills--The student will be able to:

- 04.01 Set up and operate gas and electric various welding equipment.
- 04.02 Burn (cut) material using mechanized or hand-held gas torch equipment.
- 04.03 Prepare metal surfaces for welding.
- 04.04 Identify type of metal to be welded.
- 04.05 Braze metal frames and structures.
- 04.06 Fabricate metal frames and structures.
- 04.07 Pressure test weldment.
- 04.08 Perform plug weld technique.
- 04.09 Gas weld ferrous metals in all positions with or without filler rod.
- 04.10 Perform TIG welding in aluminum and stainless steel.
- 04.11 Use and maintain TIG welding equipment.
- 04.12 Perform MIG type welding on various metals.
- 04.13 Use welding principles to heat and remove broken screws and bolts.

05.0 Remove and install engines--The student will be able to:

- 05.01 Disconnect engine, mounts, wiring and lines.
- 05.02 Operate hydraulic engine hoist.
- 05.03 Mount engine mounts, wiring and lines.
- 05.04 Reconnect engine mounts, wiring and lines.
- 05.05 Cut openings for different engine installations.
- 05.06 Mount jet drive type of engine.
- 05.07 Align inboard (gas and diesel) engines to manufacturers' specifications.
- 05.08 Mount and align stern drive to housing using manufacturers' special tools and manuals.

06.0 Recondition and service engines--The student will be able to:

- 06.01 Remove and replace power head.
- 06.02 Disassemble engine.
- 06.03 Clean engine parts for inspection.
- 06.04 Inspect and check for proper condition.

- 06.05 Remove and replace oil pump.
- 06.06 Remove and replace fuel pump.
- 06.07 Service a multi-piece crankshaft.
- 06.08 Replace connecting rods and bearings.
- 06.09 Grind valves and time valves.
- 06.10 Inspect and grind power head.
- 06.11 Remove and replace flywheel.
- 06.12 Remove and replace exhaust manifolds.
- 06.13 Perform cylinder compression test.
- 06.14 Perform engine tune up.
- 06.15 Perform operational inspection of engine lubrication system.
- 06.16 Remove and service piston ring and pistons.
- 06.17 Fit piston pins.
- 06.18 Inspect crankshaft, camshaft, connecting rods and piston assembly.
- 06.19 Torque power head and lower unit to specifications.
- 06.20 Hone cylinders to manufacturers' specifications.

07.0 Perform diagnosis service and repairs for all types of marine ignition systems--The student will be able to:

- 07.01 Diagnose, repair and replace malfunctions of ignition system components.
- 07.02 Set ignition timing.
- 07.03 Inspect secondary circuit lead wires, distributor and rotor measure resistance in secondary wires.
- 07.04 Inspect points and condensers of the primary circuit.
- 07.05 Overhaul distributors.
- 07.06 Analyze or adjust engine performance using engine analyzer devices.
- 07.07 Remove and replace spark plugs.
- 07.08 Adjust armature air gap.
- 07.09 Time the ignition system for O/B engines.
- 07.10 Use specialized test equipment.
- 07.11 Test CD type ignition systems.
- 07.12 Describe differences between marine and automotive type ignition components.
- 07.13 Observe safety practices in marine applications.
- 07.14 Read and interpret manufacturers wire diagrams.
- 07.15 Operate an engine dynamometer.

08.0 Develop skills in electrical-electronic theory of operation and application--The student will be able to:

- 08.01 Apply Ohm's Law to series circuit.
- 08.02 Apply Ohm's Law to parallel circuits.
- 08.03 Apply Ohm's Law to series-parallel circuits.
- 08.04 Perform continuity test.
- 08.05 Diagnose and repair alternator.
- 08.06 Diagnose and repair or replace charging system regulator.
- 08.07 Service or replace battery cables and battery box.
- 08.08 Diagnose, repair or replace starter.
- 08.09 Diagnose and repair malfunctions in the cranking system.
- 08.10 Perform operational inspection of lighting system.

- 08.11 Measure voltage drops, current flow, resistance in a circuit or component with a multimeter.
- 08.12 Repair or replace switches to include ignition switches.
- 08.13 Repair or replace fuse block assembly.
- 08.14 Locate and repair shorts and open circuits in wiring.
- 08.15 Inspect and test windshield wiper motor, blades and arms.
- 08.16 Inspect or replace rectifier.
- 08.17 Replace diode assembly.
- 08.18 Remove, replace and repair electrical remote control assembly.
- 08.19 Service and install diesel and gasoline marine alarm systems.

09.0 Troubleshoot and repair fuel systems--The student will be able to:

- 09.01 Identify fuel system components.
- 09.02 Explain operation of fuel system and components.
- 09.03 Repair carburetion.
- 09.04 Repair gasoline injection systems.
- 09.05 Replace fuel system components.
- 09.06 Identify fuel systems malfunction.
- 09.07 Replace fuel filter.
- 09.08 Repair fuel lines.
- 09.09 Adjust carburetor.
- 09.10 Service automatic or manual choke.
- 09.11 Service fuel pump.
- 09.12 Analyze for foreign particles in fuel system.
- 09.13 Correct fuel tank installation.
- 09.14 Test engines fuel flow using manufacturers' procedures and test equipment.
- 09.15 Identify fuel and oil specification for outboard motors, four-cycle engines and diesel applications.
- 09.16 Repair and test diesel fuel injector nozzles.
- 09.17 Repair and test diesel fuel pumps.
- 09.18 Replace and adjust unit type injector or marine diesel engines.
- 09.19 Correct procedure and timing of fuel injector pumps.
- 09.20 Conduct diesel fuel pressure test.
- 09.21 Correct rack adjustment on diesel engines.

10.0 Service cooling systems--The student will be able to:

- 10.01 Check engine temperature.
- 10.02 Test thermostat.
- 10.03 Inspect and/or replace water pump.
- 10.04 Inspect and/or replace circulating water pump.
- 10.05 Pressure test cooling system.
- 10.06 Remove, clean and replace water cooling parts.
- 10.07 Inspect and repair heat exchanges on gasoline and marine diesel engine.
- 10.08 Inspect and repair marine keel coolers.
- 10.09 Identify different types of approved coolant used in marine closed cooling systems.
- 10.10 Check engine block cooling passages for corrosion and build-up.

11.0 Service exhaust systems--The student will be able to:

- 11.01 Remove, inspect and replace an exhaust housing.
- 11.02 Remove, inspect and replace inner exhaust housing.
- 11.03 Remove, inspect and replace seal.
- 11.04 Remove, inspect and replace aft exhaust cover.
- 11.05 Remove, inspect and replace rubber mount.
- 11.06 Remove, inspect and replace clamp.
- 11.07 Remove, inspect and replace mount cover.
- 11.08 Remove, inspect and replace water tube.
- 11.09 Inspect service turbo charger.
- 11.10 Recommend correct exhaust tubing for different marine applications.
- 11.11 Service marine water cooled exhaust systems.
- 11.12 Determine back pressure by under stator exhaust applications.

12.0 Demonstrate shop management functions--The student will be able to:

- 12.01 Process work orders.
- 12.02 Process merchandise return.
- 12.03 Select shop equipment and materials.
- 12.04 Supervise employees.
- 12.05 Develop work schedules.
- 12.06 Process warranty claims.
- 12.07 Perform business and computation skills.
- 12.08 Use inventory card files and select parts from stock.
- 12.09 Sell marine merchandise.
- 12.10 Process sales and service receipts.
- 12.11 Operate computer for inventory control.
- 12.12 Operate computer for service orders.
- 12.13 Program computers for new marine parts/merchandise received.
- 12.14 Place marine merchandise into correct/orderly inventory.
- 12.15 Complete correct order forms and perform both by computer program and written process.

13.0 Identify special marine principles--The student will be able to:

- 13.01 Explain basic principles of thrust in marine applications.
- 13.02 Explain basic principles of propulsion in marine applications.
- 13.03 Explain correct propeller selection and performance.
- 13.04 Identify types of hulls used in marine applications.
- 13.05 Explain speed-length ratio and calculate hull speed and engine selection.
- 13.06 Identify bow angle and its effect on performance.
- 13.07 Perform dynamometer test on different horsepower engines.
- 13.08 Perform test tank operations using manufacturer's test wheels.
- 13.09 Perform sea trials.
- 13.10 Identify transom heights and explain the effects on engine performance/speed/horsepower.
- 13.11

14.0 Repair inboard drive systems--The student will be able to:

- 14.01 Inspect gear housing assembly.
- 14.02 Determine fluid levels.

- 14.03 Adjust gear linkages.
- 14.04 Torque mounting bolts.
- 14.05 Inspect vacuum shift controls.
- 14.06 Inspect drive shaft.
- 14.07 Lubricate universal joint.
- 14.08 Inspect gimbal bearing.
- 14.09 Inspect constant velocity joint.
- 14.10 Measure drive shaft angle and runout.
- 14.11 Replace power transmission system.
- 14.12 Rebuild power transmission.
- 14.13 Correctly apply manufacturers' procedures in shimming and adjusting operations.

15.0 Rig boats--The student will be able to:

- 15.01 Install engine steering components.
- 15.02 Install and service electrical wiring harness.
- 15.03 Install and adjust trim tabs on outboard and stern drivers, both mechanical and hydraulic type.
- 15.04 Identify sea drive installation.
- 15.05 List methods of outboard motor transom bracket installation.
- 15.06 Describe and illustrate correct lighting/wiring procedures.
- 15.07 Install engine remote control by manufacturers specifications.

16.0 Repair lower units--The student will be able to:

- 16.01 Lubricate lower unit.
- 16.02 Pressure and vacuum test lower unit.
- 16.03 Lubricate transom steering busing, cables, etc.
- 16.04 Inspect, clean and lubricate propeller shaft.
- 16.05 Inspect and install propeller.
- 16.06 Remove and replace magnets in lower unit.
- 16.07 Inspect, remove and replace vertical drive gear.
- 16.08 Remove, inspect and replace clutch dog.
- 16.09 Remove, inspect and replace clutch coils.
- 16.10 Remove, inspect and replace drive shaft pinion.
- 16.11 Remove, inspect and replace drive components.
- 16.12 Remove, inspect and replace lower unit seals.
- 16.13 Remove and replace swivel bracket.
- 16.14 Remove, inspect and replace forward and reverse driving gears.
- 16.15 Remove, inspect and replace drive shaft and components.
- 16.16 Remove, inspect and replace hydraulic pump, shaft rod end plunger.
- 16.17 Adjust trim tab.
- 16.18 Inspect and replace U-joints.
- 16.19 Inspect and repair or replace lower unit lock.
- 16.20 Remove, replace and repair tilt assemblies to include hydraulic tilt.
- 16.21 Correctly shim lower units to engine manufacturer's specifications.
- 16.22 Disassemble/reassemble stern drive gear cases.
- 16.23 Disassemble/inspect/service/reassemble inboard marine transmissions both gasoline and diesel.
- 16.24 Demonstrate the ability to analyze and solve problems, to do necessary research and to report the results in good form.

- 16.25 Develop individual responsibility for work done in the lab.
  - 16.26 Develop an understanding and skill in testing and diagnosing marine engine service problems and to develop appreciation of the true value of testing equipment.
  - 16.27 Calculate torque and gear ratio.
  - 16.28 Compare and identify all types of gear arrangements.
  - 16.29 Explain operation theory of mechanical shifting, electric shifting, and hydroelectric shifting.
  - 16.30 Identify the major parts of these shifting mechanisms.
  - 16.31 Understand by examination the principles of marine propulsion propeller theory.
  - 16.32 Demonstrate an understanding of engine installation.
  - 16.33 Apply knowledge to disassemble and assembly of all marine transmissions.
  - 16.34 Handle lifting devices properly.
  - 16.35 Diagnose planetary gear principle of operation and theory.
- 17.0 Perform corrosion experiments and understand corrosion control--The student will be able to:
- 17.01 Identify galvanic corrosion.
  - 17.02 Explain the use and function of the galvanic series.
  - 17.03 Understand corrosion and its prevention.
  - 17.04 List chemical equation and symbols.
  - 17.05 Demonstrate a basic knowledge of electricity.
  - 17.06 Identify maintenance of boat hulls and when to determine its time.
  - 17.07 Identify difference in corrosion and cavitation.
  - 17.08 Demonstrate by lab experiments cause of corrosion.
  - 17.09 List in test form, actual lab reports in the field.
  - 17.10 Distinguish fatigue corrosion.
  - 17.11 Understand electrolysis and its causes of corrosions.
  - 17.12 Correctly prepare metals for protective coatings.
  - 17.13 Identify protective coatings.
  - 17.14 Practice safe lab experiences with dangerous chemicals.
  - 17.15 Demonstrate theory of operation of impress currents.
  - 17.16 Show proper installation procedure of impress current unit onboard ship.
  - 17.17 Maintain records and diagnose impress current failure.
  - 17.18 Write report analysis on corrosion in our environment.
  - 17.19 Identify non-metallic corrosion.
  - 17.20 Define special tools used in the maintenance and testing of sacrificial anodes.
  - 17.21 Understand acrylic and styrene copolymer coating.
  - 17.22 List causes of stray current corrosion.
- 18.0 Apply fiberglass construction and maintenance procedures--The student will be able to:
- 18.01 Describe safe handling procedures and care of fiberglass resins and materials.
  - 18.02 Apply mixture methods of resins, coal tars, gel coat and paints.
  - 18.03 Describe fiberglass boat manufacturing concepts.
  - 18.04 Prepare a mold for casting a fiberglass hull.
  - 18.05 Describe installation procedures of decks and gunwale.
  - 18.06 Repair damaged fiberglass hulls.
  - 18.07 Apply modern methods of maintaining new and old fiberglass hulls.

- 18.08 Demonstrate advance methods of boat building and the manufacturing of fiberglass accessories.
- 19.0 Demonstrate appropriate communication skills--The student will be able to:
  - 19.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 19.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 19.03 Read and follow written and oral instructions.
  - 19.04 Answer and ask questions coherently and concisely.
  - 19.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 19.06 Demonstrate appropriate telephone/communication skills.
- 20.0 Demonstrate appropriate math skills--The student will be able to:
  - 20.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 20.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 20.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 20.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 20.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 21.0 Demonstrate appropriate understanding of basic science--The student will be able to:
  - 21.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 21.02 Draw conclusions or make inferences from data.
  - 21.03 Identify health related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 21.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 22.0 Demonstrate employability skills--The student will be able to:
  - 22.01 Conduct a job search.
  - 22.02 Secure information about a job.
  - 22.03 Identify documents which may be required when applying for a job interview.
  - 22.04 Complete a job application form correctly.
  - 22.05 Demonstrate competence in job interview techniques.
  - 22.06 Identify and adopt acceptable work habits.
  - 22.07 Identify and adopt acceptable work habits.
  - 22.08 Demonstrate knowledge of how to make appropriate job changes.
  - 22.09 Demonstrate acceptable employee health habits.
  - 22.10 Demonstrate knowledge of the "Federal Right-To-Know Law" as recorded in 29 CFR-1910, 1200.

23.0 Demonstrate an understanding of entrepreneurship--The student will be able to:

- 23.01 Define entrepreneurship.
- 23.02 Describe the importance of entrepreneurship to the American economy.
- 23.03 List the advantages and disadvantages of business ownership.
- 23.04 Identify the risks involved in ownership of a business.
- 23.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 23.06 Identify the business skills needed to operate a small business efficiently and effectively.



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**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Technology  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0615080401
Program Type	College Credit Certificate (CCC)
Program Length	34 Credits
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Marine Engineering, Management & Seamanship AS/AAS degree program (1615080400/0615080400).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 installation and operation of diesel and gasoline engines; troubleshooting for diesel and gasoline engines; engine maintenance; propeller selection; and corrosion control.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Perform basic shop practices.
- 02.0 Describe operational theory of (2) two and (4) four cycle engines - Diesel and Gasoline.
- 03.0 Use service manuals and parts references.
- 04.0 Perform basic welding skills.
- 05.0 Remove and install engines.
- 06.0 Recondition and service engines.
- 07.0 Perform diagnosis service and repairs to all types of marine ignition systems.
- 08.0 Develop skills in electrical-electronic theory of operation and application.
- 09.0 Troubleshoot and repair fuel systems.
- 10.0 Service cooling systems.
- 11.0 Service exhaust systems.
- 12.0 Repair inboard drive systems.
- 13.0 Rig boats.
- 14.0 Repair lower units.
- 15.0 Perform corrosion experiments and understand corrosion control.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Marine Technology  
**CIP Number:** 0615080401  
**Program Length:** 34 Credit Hours  
**SOC Code(s):** 49-3051

This certificate program is part of the Marine Engineering, Management & Seamanship AS/AAS degree program (1615080400/0615080400). At the completion of this program, the student will be able to:

01.0 Perform basic shop practices--The student will be able to:

- 01.01 Perform calculations using decimals and fractions to include subtraction, multiplication and division.
- 01.02 Change fractions to decimals and decimals to fractions.
- 01.03 Determine metric system measurements.
- 01.04 Comply with safety rules and regulations.
- 01.05 Operate hand tools safely and properly.
- 01.06 Set up and use power tools safely and properly.
- 01.07 Set up and use precision measuring tools.
- 01.08 Drill and remove broken studs and install helicoils.
- 01.09 Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility.
- 01.10 Install fasteners such as screws, bolts and keys; and utilize screw extractor, thread cutting tape and dies.
- 01.11 Locate and match electrical units by their symbols on a wiring diagram.
- 01.12 Draw performance charts and graphs on propeller selection and engine specifications.

02.0 Describe operational theory of (2) two and (4) four cycle engines-diesel and gasoline--  
The student will be able to:

- 02.01 Distinguish between the characteristics of four-stroke cycle engine including diesel engines.
- 02.02 Identify basic engine parts.
- 02.03 Describe the functions of the crankshaft.
- 02.04 List the information which may be found on the engine nameplate.
- 02.05 Describe types of motion and simple machines and characteristics of energy.
- 02.06 Calculate problems using the formula for work, horsepower and torque.
- 02.07 Describe the main theoretical concept of heat engines.
- 02.08 Describe the process by which an internal combustion engine converts chemical energy into rotary motion.
- 02.09 Calculate problems using the formulas for engine cubic displacement and compression ratio.
- 02.10 Describe the principles of operation of four-and two-stroke cycle engines.
- 02.11 Identify the parts of a camshaft lobe-crankshaft lobe.
- 02.12 Describe valve timing and overlap procedures.
- 02.13 Identify types of valve arrangements.

- 02.14 Identify types of engine construction.
  - 02.15 Describe piston engine operation, design loop charged.
  - 02.16 Describe the operation of two- and four-stroke cycle engines to include diesel engines.
  - 02.17 Distinguish different engine design by manufacturers.
  - 02.18 Identify marine engine makeup and conversion from auto engines
- 03.0 Use service manuals and parts references--The student will be able to:
- 03.01 Demonstrate use of multiple and single type shop service manual.
  - 03.02 Demonstrate use of specification handbooks and tune up charts.
  - 03.03 Demonstrate use of manufacturer parts catalogs.
  - 03.04 Demonstrate use of microfiche.
  - 03.05 Demonstrate use of marine engine installation manuals.
  - 03.06 Demonstrate use of flat rate and service bulletins.
- 04.0 Perform basic welding skills--The student will be able to:
- 04.01 Set up and operate gas and electric various welding equipment.
  - 04.02 Burn (cut) material using mechanized or hand-held gas torch equipment.
  - 04.03 Prepare metal surfaces for welding.
  - 04.04 Identify type of metal to be welded.
  - 04.05 Braze metal frames and structures.
  - 04.06 Fabricate metal frames and structures.
  - 04.07 Pressure test weldment.
  - 04.08 Perform plug weld technique.
  - 04.09 Gas weld ferrous metals in all positions with or without filler rod.
  - 04.10 Perform TIG welding in aluminum and stainless steel.
  - 04.11 Use and maintain TIG welding equipment.
  - 04.12 Perform MIG type welding on various metals.
  - 04.13 Use welding principles to heat and remove broken screws and bolts.
- 05.0 Remove and install engines--The student will be able to:
- 05.01 Disconnect engine, mounts, wiring and lines.
  - 05.02 Operate hydraulic engine hoist.
  - 05.03 Mount engine mounts, wiring and lines.
  - 05.04 Reconnect engine mounts, wiring and lines.
  - 05.05 Cut openings for different engine installations.
  - 05.06 Mount jet drive type of engine.
  - 05.07 Align inboard (gas and diesel) engines to manufacturers' specifications.
  - 05.08 Mount and align stern drive to housing using manufacturers' special tools and manuals.
- 06.0 Recondition and service engines--The student will be able to:
- 06.01 Remove and replace power head.
  - 06.02 Disassemble engine.
  - 06.03 Clean engine parts for inspection.
  - 06.04 Inspect and check for proper condition.
  - 06.05 Remove and replace oil pump.

- 06.06 Remove and replace fuel pump.
- 06.07 Service a multi-piece crankshaft.
- 06.08 Replace connecting rods and bearings.
- 06.09 Grind valves and time valves.
- 06.10 Inspect and grind power head.
- 06.11 Remove and replace flywheel.
- 06.12 Remove and replace exhaust manifolds.
- 06.13 Perform cylinder compression test.
- 06.14 Perform engine tune up.
- 06.15 Perform operational inspection of engine lubrication system.
- 06.16 Remove and service piston ring and pistons.
- 06.17 Fit piston pins.
- 06.18 Inspect crankshaft, camshaft, connecting rods and piston assembly.
- 06.19 Torque power head and lower unit to specifications.
- 06.20 Hone cylinders to manufacturers' specifications.

07.0 Perform diagnosis service and repairs for all types of marine ignition systems--The student will be able to:

- 07.01 Diagnose, repair and replace malfunctions of ignition system components.
- 07.02 Set ignition timing.
- 07.03 Inspect secondary circuit lead wires, distributor and rotor measure resistance in secondary wires.
- 07.04 Inspect points and condensers of the primary circuit.
- 07.05 Overhaul distributors.
- 07.06 Analyze or adjust engine performance using engine analyzer devices.
- 07.07 Remove and replace spark plugs.
- 07.08 Adjust armature air gap.
- 07.09 Time the ignition system for O/B engines.
- 07.10 Use specialized test equipment.
- 07.11 Test CD type ignition systems.
- 07.12 Describe differences between marine and automotive type ignition components.
- 07.13 Observe safety practices in marine applications.
- 07.14 Read and interpret manufacturers wire diagrams.
- 07.15 Operate an engine dynamometer.

08.0 Develop skills in electrical-electronic theory of operation and application--The student will be able to:

- 08.01 Apply Ohm's Law to series circuit.
- 08.02 Apply Ohm's Law to parallel circuits.
- 08.03 Apply Ohm's Law to series-parallel circuits.
- 08.04 Perform continuity test.
- 08.05 Diagnose and repair alternator.
- 08.06 Diagnose and repair or replace charging system regulator.
- 08.07 Service or replace battery cables and battery box.
- 08.08 Diagnose, repair or replace starter.
- 08.09 Diagnose and repair malfunctions in the cranking system.
- 08.10 Perform operational inspection of lighting system.
- 08.11 Measure voltage drops, current flow, resistance in a circuit or component with a multimeter.

- 08.12 Repair or replace switches to include ignition switches.
- 08.13 Repair or replace fuse block assembly.
- 08.14 Locate and repair shorts and open circuits in wiring.
- 08.15 Inspect and test windshield wiper motor, blades and arms.
- 08.16 Inspect or replace rectifier.
- 08.17 Replace diode assembly.
- 08.18 Remove, replace and repair electrical remote control assembly.
- 08.19 Service and install diesel and gasoline marine alarm systems.

09.0 Troubleshoot and repair fuel systems--The student will be able to:

- 09.01 Identify fuel system components.
- 09.02 Explain operation of fuel system and components.
- 09.03 Repair carburetion.
- 09.04 Repair gasoline injection systems.
- 09.05 Replace fuel system components.
- 09.06 Identify fuel systems malfunction.
- 09.07 Replace fuel filter.
- 09.08 Repair fuel lines.
- 09.09 Adjust carburetor.
- 09.10 Service automatic or manual choke.
- 09.11 Service fuel pump.
- 09.12 Analyze for foreign particles in fuel system.
- 09.13 Correct fuel tank installation.
- 09.14 Test engines fuel flow using manufacturers' procedures and test equipment.
- 09.15 Identify fuel and oil specification for outboard motors, four-cycle engines and diesel applications.
- 09.16 Repair and test diesel fuel injector nozzles.
- 09.17 Repair and test diesel fuel pumps.
- 09.18 Replace and adjust unit type injector or marine diesel engines.
- 09.19 Correct procedure and timing of fuel injector pumps.
- 09.20 Conduct diesel fuel pressure test.
- 09.21 Correct rack adjustment on diesel engines.

10.0 Service cooling systems--The student will be able to:

- 10.01 Check engine temperature.
- 10.02 Test thermostat.
- 10.03 Inspect and/or replace water pump.
- 10.04 Inspect and/or replace circulating water pump.
- 10.05 Pressure test cooling system.
- 10.06 Remove, clean and replace water cooling parts.
- 10.07 Inspect and repair heat exchanges on gasoline and marine diesel engine.
- 10.08 Inspect and repair marine keel coolers.
- 10.09 Identify different types of approved coolant used in marine closed cooling systems.
- 10.10 Check engine block cooling passages for corrosion and build-up.

11.0 Service exhaust systems--The student will be able to:

- 11.01 Remove, inspect and replace an exhaust housing.

- 11.02 Remove, inspect and replace inner exhaust housing.
- 11.03 Remove, inspect and replace seal.
- 11.04 Remove, inspect and replace aft exhaust cover.
- 11.05 Remove, inspect and replace rubber mount.
- 11.06 Remove, inspect and replace clamp.
- 11.07 Remove, inspect and replace mount cover.
- 11.08 Remove, inspect and replace water tube.
- 11.09 Inspect service turbo charger.
- 11.10 Recommend correct exhaust tubing for different marine applications.
- 11.11 Service marine water cooled exhaust systems.
- 11.12 Determine back pressure by under stator exhaust applications.

12.0 Repair inboard drive systems--The student will be able to:

- 12.01 Inspect gear housing assembly.
- 12.02 Determine fluid levels.
- 12.03 Adjust gear linkages.
- 12.04 Torque mounting bolts.
- 12.05 Inspect vacuum shift controls.
- 12.06 Inspect drive shaft.
- 12.07 Lubricate universal joint.
- 12.08 Inspect gimbal bearing.
- 12.09 Inspect constant velocity joint.
- 12.10 Measure drive shaft angle and runout.
- 12.11 Replace power transmission system.
- 12.12 Rebuild power transmission.
- 12.13 Correctly apply manufacturers' procedures in shimming and adjusting operations.

13.0 Rig boats--The student will be able to:

- 13.01 Install engine steering components.
- 13.02 Install and service electrical wiring harness.
- 13.03 Install and adjust trim tabs on outboard and stern drivers, both mechanical and hydraulic type.
- 13.04 Identify sea drive installation.
- 13.05 List methods of outboard motor transom bracket installation.
- 13.06 Describe and illustrate correct lighting/wiring procedures.
- 13.07 Install engine remote control by manufacturers specifications.

14.0 Repair lower units--The student will be able to:

- 14.01 Lubricate lower unit.
- 14.02 Pressure and vacuum test lower unit.
- 14.03 Lubricate transom steering busing, cables, etc.
- 14.04 Inspect, clean and lubricate propeller shaft.
- 14.05 Inspect and install propeller.
- 14.06 Remove and replace magnets in lower unit.
- 14.07 Inspect, remove and replace vertical drive gear.
- 14.08 Remove, inspect and replace clutch dog.
- 14.09 Remove, inspect and replace clutch coils.
- 14.10 Remove, inspect and replace drive shaft pinion.

- 14.11 Remove, inspect and replace drive components.
  - 14.12 Remove, inspect and replace lower unit seals.
  - 14.13 Remove and replace swivel bracket.
  - 14.14 Remove, inspect and replace forward and reverse driving gears.
  - 14.15 Remove, inspect and replace drive shaft and components.
  - 14.16 Remove, inspect and replace hydraulic pump, shaft rod end plunger.
  - 14.17 Adjust trim tab.
  - 14.18 Inspect and replace U-joints.
  - 14.19 Inspect and repair or replace lower unit lock.
  - 14.20 Remove, replace and repair tilt assemblies to include hydraulic tilt.
  - 14.21 Correctly shim lower units to engine manufacturer's specifications.
  - 14.22 Disassemble/reassemble stern drive gear cases.
  - 14.23 Disassemble/inspect/service/reassemble inboard marine transmissions both gasoline and diesel.
  - 14.24 Demonstrate the ability to analyze and solve problems, to do necessary research and to report the results in good form.
  - 14.25 Develop individual responsibility for work done in the lab.
  - 14.26 Develop an understanding and skill in testing and diagnosing marine engine service problems and to develop appreciation of the true value of testing equipment.
  - 14.27 Calculate torque and gear ratio.
  - 14.28 Compare and identify all types of gear arrangements.
  - 14.29 Explain operation theory of mechanical shifting, electric shifting, and hydroelectric shifting.
  - 14.30 Identify the major parts of these shifting mechanisms.
  - 14.31 Understand by examination the principles of marine propulsion propeller theory.
  - 14.32 Demonstrate an understanding of engine installation.
  - 14.33 Apply knowledge to disassemble and assembly of all marine transmissions.
  - 14.34 Handle lifting devices properly.
  - 14.35 Diagnose planetary gear principle of operation and theory.
- 15.0 Perform corrosion experiments and understand corrosion control--The student will be able to:
- 15.01 Identify galvanic corrosion.
  - 15.02 Explain the use and function of the galvanic series.
  - 15.03 Understand corrosion and its prevention.
  - 15.04 List chemical equation and symbols.
  - 15.05 Demonstrate a basic knowledge of electricity.
  - 15.06 Identify maintenance of boat hulls and when to determine its time.
  - 15.07 Identify difference in corrosion and cavitation.
  - 15.08 Demonstrate by lab experiments cause of corrosion.
  - 15.09 List in test form, actual lab reports in the field.
  - 15.10 Distinguish fatigue corrosion.
  - 15.11 Understand electrolysis and its causes of corrosions.
  - 15.12 Correctly prepare metals for protective coatings.
  - 15.13 Identify protective coatings.
  - 15.14 Practice safe lab experiences with dangerous chemicals.
  - 15.15 Demonstrate theory of operation of impress currents.
  - 15.16 Show proper installation procedure of impress current unit onboard ship.
  - 15.17 Maintain records and diagnose impress current failure.



- 15.18 Write report analysis on corrosion in our environment.
- 15.19 Identify non-metallic corrosion.
- 15.20 Define special tools used in the maintenance and testing of sacrificial anodes.
- 15.21 Understand acrylic and styrene copolymer coating.
- 15.22 List causes of stray current corrosion.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Dealer-Specific Automotive Technology  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>AS</b>	<b>AAS</b>
CIP Number	1647060407	0647060407
Program Type	College Credit	College Credit
Standard Length	74 credit hours	74 credit hours
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3023	49-3023
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fl DOE.org/workforce/perkins/perkins_resources.asp">http://www.fl DOE.org/workforce/perkins/perkins_resources.asp</a>	

### **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 a written business plan that establishes a partnership agreement between the educational institution and the automotive industry.

### **Program Structure**

This program is a planned sequence of instruction consisting of 74 credit hours.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for employment and/or specialized training in the automotive industry. The program provides specialized corporate/association job preparatory training.

Automotive Technology Programs sponsored by automobile manufacturers require an internship at a dealership.

The program must be NATEF Master Certified and have a business plan approved by the appropriate industry affiliated organization. Instructors must be ASE Certified in all areas that they teach in addition to being certified in Engine Performance and Electrical/Electronic Systems. ASE Master Technician and Advanced Engine Performance (L1) ASE Certification is preferred. Instructors must meet the specific product certification as specified in the business plan.

Program must meet the equipment and specialty tool requirement as specified in the business plan. Must offer Federally recognized refrigerant-recycling certification training.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 74 credit hours according to Rule 6A-14.030, F.A.C.

## **Standards**

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

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry.
- 02.0 Demonstrate proficiency in appropriate math skills.
- 03.0 Demonstrate proficiency in appropriate understanding of basic sciences.
- 04.0 Demonstrate proficiency in employability skills.
- 05.0 Demonstrate proficiency in appropriate communication skills.
- 06.0 Demonstrate proficiency in understanding of entrepreneurship.
- 07.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry.
- 08.0 Demonstrate proficiency in routine maintenance and consumer services.
- 09.0 Demonstrate proficiency in engine theory and repairs.
- 10.0 Demonstrate proficiency in the operation and servicing of automatic transmission/trans-axle.
- 11.0 Demonstrate proficiency in the operation and servicing of manual drive trains and axles.
- 12.0 Demonstrate proficiency in the operation of steering and suspension systems.
- 13.0 Demonstrate proficiency in the operation and servicing of automotive brake systems.
- 14.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train.
- 15.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems.
- 16.0 Demonstrate proficiency in engine performance service.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Dealer-Specific Automotive Technology  
**CIP Numbers:** 1647060407 A.S., 0647060407 A.A.S.  
**Program Length:** 74 credit hours  
**SOC Code(s):** 49-3023

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry--The student will be able to:
- 01.01 Apply shop safety rules, EPA and OSHA standards.
  - 01.02 Identify and use appropriate emergency first aid procedures.
  - 01.03 Identify, use and maintain hand and power tools properly.
  - 01.04 Identify and practice using appropriate precision measuring tools and torque methods.
  - 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, to include thread repair.
  - 01.06 Identify and use metric and English measurement skills.
  - 01.07 Use computer and operate keyboard.
  - 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
  - 01.09 Identify and describe typical automotive lubricants and lubricant properties.
  - 01.10 Interpret the Florida 'Workers Right To Know Law'.
  - 01.11 Identify and describe typical automotive seals and gaskets.
  - 01.12 Identify and use the proper procedures required for cutting tubing and double and ISO flaring.
  - 01.13 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
  - 01.14 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
  - 01.15 Describe and identify supplemental restraint systems (SRS).
  - 01.16 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.
- 02.0 Demonstrate proficiency in appropriate math skills--The student will be able to:
- 02.01 Read and interpret measuring devices.
  - 02.02 Solve number word problems.
  - 02.03 Solve percentage problems.
  - 02.04 Operate a calculator.
  - 02.05 Use metric units related to auto industry.
  - 02.06 Convert inches to millimeters and millimeters to inches.
  - 02.07 Solve problems of length, area, volume and weight to include the circumference of a circle, the area of a rectangle, and the volume of a cylinder.

- 02.08 Measure size within a specified tolerance.
  - 02.09 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 02.10 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 02.11 Identify various types of gears and interpret the meaning of a gear ratio number.
- 03.0 Demonstrate proficiency in appropriate understanding of basic sciences--The student will be able to:
- 03.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 03.02 Draw conclusions or make inferences from data.
  - 03.03 Identify health related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 03.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 04.0 Demonstrate proficiency in employability skills--The student will be able to:
- 04.01 Identify employment requirements for an automotive career.
  - 04.02 Identify documents, which may be required when applying for a job.
  - 04.03 Complete a job application form correctly.
  - 04.04 Identify and adopt acceptable work habits.
  - 04.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens.
  - 04.06 Demonstrate appropriate telephone/communication skills.
  - 04.07 Conduct a job search.
  - 04.08 Demonstrate competence in job interview techniques.
  - 04.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 04.10 Demonstrate knowledge of how to make job changes appropriately.
- 05.0 Demonstrate proficiency in appropriate communication skills--The student will be able to:
- 05.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 05.02 Read and follow written and oral instructions.
  - 05.03 Answer and ask questions coherently and concisely.
  - 05.04 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 06.0 Demonstrate proficiency in understanding of entrepreneurship--The student will be able to:
- 06.01 Define entrepreneurship.
  - 06.02 Describe the importance of entrepreneurship to the American economy.
  - 06.03 List the advantages and disadvantages of business ownership.
  - 06.04 Identify the risks involved in ownership of business.
  - 06.05 Identify the necessary personal characteristics of a successful entrepreneur.

- 06.06 Identify the business skills needed to operate a small business efficiently and effectively.
- 06.07 Identify and apply communication skills used in automotive careers.
- 07.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry--  
The student will be able to:
  - 07.01 Explain the effects of chemical/substance abuse.
  - 07.02 Identify principles of stress management.
  - 07.03 Identify and define career opportunities in the automotive service industry.
  - 07.04 Demonstrate acceptable industry dress code.
  - 07.05 Identify and demonstrate proper customer relations skills.
  - 07.06 Identify and define payroll deductions (taxes, insurance, social security) employee benefits and pay systems.
  - 07.07 Identify principles of time management.
  - 07.08 Identify acceptable customer relations.
- 08.0 Demonstrate proficiency in routine maintenance and consumer services--The student will be able to:
  - 08.01 Inspect, test head lamps, tail lamps and stop lamps. Aim headlights.
  - 08.02 Perform oil and filter change.
  - 08.03 Service transmission; perform visual inspection; replace fluids and filters.
  - 08.04 Inspect engine assembly for fuel, oil, coolant, and other leaks.
  - 08.05 Inspect manual and power steering fluid levels and condition.
  - 08.06 Check rear axle drive assembly seals and vents; check lube level.
  - 08.07 Inspect and replace power steering hoses and fittings.
  - 08.08 Lubricate suspension and steering systems.
  - 08.09 Inspect, remove, and replace shock absorbers.
  - 08.10 Remove, inspect, and service front and rear wheel bearings on non-drive axles.
  - 08.11 Inspect tires, diagnose tire wear patterns. Check and adjust air pressure.
  - 08.12 Rotate tires according to manufacturer's recommendations, install wheels, torque lug nuts.
  - 08.13 Balance wheel and tire assembly (static and dynamic).
  - 08.14 Dismount, inspect, repair, and remount tire on wheel.
  - 08.15 Check master cylinder for internal and external leaks and proper operation.
  - 08.16 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
  - 08.17 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
  - 08.18 Select, handle, store, and install brake fluids to proper level.
  - 08.19 Fill master cylinder with recommended fluid and seat pads.
  - 08.20 Inspect, clean, fill, and replace battery.
  - 08.21 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
  - 08.22 Start a vehicle using jumper cables using a battery auxiliary power supply.
  - 08.23 Perform slow/fast battery charge.
  - 08.24 Observe dash warning lamps during bulb check.
  - 08.25 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).
  - 08.26 Practice recommended precautions when handling static sensitive devices.

- 08.27 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.
- 08.28 Perform product specific service procedures.
- 08.29 Reset product specific service indicator.
- 08.30 Demonstrate knowledge of manufacturer policies and procedures.
- 08.31 Identify product specific engine systems.
- 08.32 Identify product specific automatic transmission systems.
- 08.33 Identify product specific manual transmission systems.
- 08.34 Identify product specific electrical & electronic systems.
- 08.35 Identify product specific Heating & A/C systems.
- 08.36 Identify product specific steering & suspension systems.
- 08.37 Identify product specific brake systems.
- 08.38 Identify product specific audio systems.
- 08.39 Identify product specific safety systems.
- 08.40 Identify product specific accessories.
- 08.41 Use wiring diagrams of electrical circuit problems.
- 08.42 Check electrical circuits with a test light; determine necessary action.
- 08.43 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).
- 08.44 Check current flow in electrical/electronic circuits and components using an ammeter.
- 08.45 Check electrical circuits using jumper wires.
- 08.46 Measure and diagnose the cause(s) of abnormal key-off battery drain.
- 08.47 Inspect and test fusible links, circuit breakers, and fuses; replace as needed.
- 08.48 Perform battery capacity (load, high-rate discharge) test; determine needed service.
- 08.49 Maintain or restore electronic memory functions.
- 08.50 Perform starter current draw and circuit voltage drop test; determine necessary action.
- 08.51 Remove and replace/reinstall starter.
- 08.52 Perform charging system test.
- 08.53 Remove, inspect, and replace/reinstall alternator.
- 08.54 Demonstrate retrieving stored diagnostic trouble codes.
- 08.55 Obtain and interpret digital multimeter (DMM) readings.
- 08.56 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
- 08.57 Replace fuel filters.
- 08.58 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.
- 08.59 Adjust valves on engines with mechanical lifters.
- 08.60 Remove and replace valve cover gaskets (ASE).
- 08.61 Return cores for rebuilt and exchange items.
- 08.62 Inspect passenger restraint system, repair if needed.
- 08.63 Maintain product specific engine systems.
- 08.64 Maintain product specific automatic transmission systems.
- 08.65 Maintain product specific manual transmission systems.
- 08.66 Maintain product specific electrical & electronic systems.
- 08.67 Maintain product specific Heating & A/C systems.
- 08.68 Maintain product specific steering & suspension systems.
- 08.69 Maintain product specific brake systems.
- 08.70 Maintain product specific audio systems.
- 08.71 Maintain product specific safety systems.



08.72 Maintain product specific accessories.

09.0 Demonstrate proficiency in engine theory and repair--The student will be able to:

- 09.01 Service product specific engine systems.
- 09.02 Interpret and verify complaint; determine necessary action.
- 09.03 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 09.04 Listen to engine noises; determine necessary action.
- 09.05 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.
- 09.06 Perform engine vacuum tests; determine necessary action.
- 09.07 Perform cylinder power balance tests; determine necessary action.
- 09.08 Perform cylinder compression tests; determine necessary action.
- 09.09 Perform cylinder leakage tests; determine necessary action.
- 09.10 Remove engine (front-wheel drive); prepare for disassembly.
- 09.11 Reinstall engine (front-wheel drive).
- 09.12 Remove engine (rear-wheel drive); prepare for disassembly.
- 09.13 Reinstall engine (rear-wheel drive).

### **Cylinder Head and Valve Train Diagnosis and Repair**

- 09.14 Remove cylinder head(s); inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.
- 09.15 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.
- 09.16 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed.
- 09.17 Inspect valve spring retainers, locks, and valve grooves.
- 09.18 Replace valve stem seals.
- 09.19 Inspect valve guides for wear; check valve guide height and stem- to-guide clearance; recondition or replace as needed.
- 09.20 Inspect valves; resurface or replace.
- 09.21 Inspect valve seats; resurface or replace.
- 09.22 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed.
- 09.23 Check valve spring assembled height and valve stem height; service valve and spring assemblies as needed.
- 09.24 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); repair or replace.
- 09.25 Inspect hydraulic or mechanical lifters; replace as needed.
- 09.26 Adjust valves (mechanical or hydraulic lifters).
- 09.27 Inspect and replace camshaft drives (including gear wear and backlash, sprocket and chain wear, overhead cam drive sprockets, drive belts, belt tension, and tensioners).
- 09.28 Inspect camshaft for run out; measure journals and lobes for wear.
- 09.29 Inspect and measure camshaft bearings for wear, damage, out-of round, and alignment; determine necessary action.
- 09.30 Verify camshaft(s) timing according to manufacturer's specifications and procedure.
- 09.31 Service product specific cam drive systems.

09.32 Perform product specific valve adjustments.

### **Engine Block Diagnosis and Repair**

- 09.33 Inspect and replace pans, covers, gaskets, and seals.
- 09.34 Inspect engine block for cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed repairs.
- 09.35 Inspect internal and external threads; repair as needed.
- 09.36 Remove cylinder wall ridges.
- 09.37 Inspect and measure cylinder walls for damage and wear; determine necessary action.
- 09.38 Deglaze and clean cylinder walls.
- 09.39 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
- 09.40 Inspect crankshaft for surface cracks and journal damage; check oil passage condition; measure journal wear; determine necessary action.
- 09.41 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings).
- 09.42 Identify position and bearing wear patterns that include connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition.
- 09.43 Inspect, measure, service or replace pistons.
- 09.44 Inspect, measure, and install piston rings.
- 09.45 Inspect, repair or replace crankshaft vibration damper (harmonic balancer).
- 09.46 Inspect flywheel or flexplate and ring gear for cracks and wear; measure run out; determine necessary action.
- 09.47 Inspect, remove, and replace crankshaft pilot bearing or bushing (as applicable).
- 09.48 Reassemble engine components using correct gaskets and sealants.
- 09.49 Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.

### **Lubrication and Cooling Systems Diagnosis and Repairs**

- 09.50 Prime engine lubrication system.
- 09.51 Perform oil pressure tests; determine necessary action.
- 09.52 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; replace as needed.
- 09.53 Perform cooling system tests (pressure, combustion leakage, and temperature); determine necessary action.
- 09.54 Inspect, replace, and adjust drive belts and pulleys.
- 09.55 Inspect and replace engine cooling and heater system hoses.
- 09.56 Inspect, test, and replace thermostat and housing.
- 09.57 Inspect coolant; drain, flush, and refill cooling system with recommended coolant and bleed air as required.
- 09.58 Inspect, test, remove, and replace water pump.
- 09.59 Inspect and test radiator, pressure cap, and coolant recovery system; remove and replace radiator.
- 09.60 Clean, inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.

- 09.61 Inspect and test electrical fan control system and circuits.
- 09.62 Inspect auxiliary oil coolers; replace as needed.
- 09.63 Inspect, test, and replace oil temperature and pressure switches and sensors.
- 09.64 Perform oil and filter change.
- 09.65 Service product specific water pumps.
- 09.66 Service product specific belt drive & tensioner systems.

10.0 Demonstrate proficiency in the operation and servicing of automatic transmission/transaxle--The student will be able to:

- 10.01 Interpret and verify driver's complaint; verify proper engine operation; determine necessary action.
- 10.02 Diagnose unusual fluid usage, level, and condition problems; determine necessary action.
- 10.03 Perform pressure tests; determine necessary action.
- 10.04 Perform stall tests; determine necessary action.
- 10.05 Perform lock-up converter system tests; determine necessary action.
- 10.06 Diagnose electronic, mechanical, and vacuum control systems; determine necessary action.
- 10.07 Diagnose noise and vibration problems; determine necessary action.

### **Transmission and Transaxle Maintenance and Adjustment**

- 10.08 Inspect, adjust or replace manual shift valve and throttle (TV) linkages or cables and check gear select indicator (as applicable).
- 10.09 Service transmission; perform visual inspection; replace fluids and filters.

### **In-Vehicle Transmission and Transaxle Repair**

- 10.10 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.
- 10.11 Inspect, repair, and replace governor assembly.
- 10.12 Inspect and replace external seals and gaskets.
- 10.13 Inspect extension housing; replace bushing and seals.
- 10.14 Inspect, leak test, flush, and replace cooler, lines, and fittings.
- 10.15 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 10.16 Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets); check/adjust valve body bolt torque.
- 10.17 Inspect servo bore, piston, seals, pin, spring, and retainers; repair or replace as needed.
- 10.18 Inspect accumulator bore, piston, seals, spring, and retainer; repair or replace as needed.
- 10.19 Inspect, test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses).
- 10.20 Inspect, replace, and align power train mounts.
- 10.21 Inspect and replace parking pawl, shaft, spring, and retainer.

### **Off-Vehicle Transmission and Transaxle Repair**

### **(Removal, Disassembly, and Reinstallation)**

- 10.22 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 10.23 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 10.24 Disassemble, clean, and inspect transmission/transaxle.
- 10.25 Assemble transmission/transaxle.

### **Oil Pump and Converter**

- 10.26 Inspect converter flex plate, attaching parts, pilot and pump drive, and seal areas.
- 10.27 Measure torque converter end play and check for interference check stator clutch.
- 10.28 Inspect, measure, and replace oil pump housings, shafts, vanes, rotors, gears, valves, seals, and bushings.
- 10.29 Check torque converter and transmission cooling system for contamination.

### **Gear Train, Shafts, Bushings and Case**

- 10.30 Check end play or preload; determine needed service.
- 10.31 Inspect, measure, and replace thrust washers and bearings.
- 10.32 Inspect oil delivery seal rings, ring grooves, and sealing surface areas.
- 10.33 Inspect bushings; replace as needed.
- 10.34 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); replace as needed.
- 10.35 Inspect cases, bores, passages, bushings, vents, and mating surfaces; replace as needed.
- 10.36 Inspect transaxle drive, link chains, sprockets, gears, bearings and bushings; replace as needed.
- 10.37 Inspect, measure, repair, adjust or replace transaxle final drive components.
- 10.38 Inspect and reinstall parking pawl, shaft, spring, and retainer; replace as needed.

### **Friction and Reaction Units**

- 10.39 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; replace as needed.
- 10.40 Measure clutch pack clearance; adjust as needed.
- 10.41 Air test operation of clutch and servo assemblies.
- 10.42 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed.
- 10.43 Inspect bands and drums; replace as needed.
- 10.44 Achieve product specific certification requirements for automatic transmission systems.
- 10.45 Achieve product specific certification requirements for automatic transaxle systems.
- 10.46 Achieve product specific certification requirements for computer shifted transmission systems.

- 11.0 Demonstrate proficiency in the operation and assembly of manual drive transmission/transaxle--The student will be able to:

- 11.01 Diagnose clutch noise, binding, slippage, pulsation, and chatter problems; determine necessary action.
- 11.02 Inspect, adjust or replace clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs.
- 11.03 Inspect, adjust, repair or replace hydraulic clutch slave master-cylinders, lines, and hoses.
- 11.04 Inspect, adjust or replace release (throw-out) bearing, lever, and pivot.
- 11.05 Inspect and replace clutch pressure plate assembly and clutch disc.
- 11.06 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable).
- 11.07 Inspect, repair, and service or replace flywheel and ring gear.
- 11.08 Inspect engine block, clutch (bell) housing, and transmission case mating surface; determine necessary action.
- 11.09 Measure flywheel-to-block run out and crankshaft end play; determine necessary action.
- 11.10 Measure clutch (bell) housing bore-to-crankshaft run out and face squareness; determine needed service.

### **Transmission Diagnosis and Repair**

- 11.11 Diagnose transmission noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action.
- 11.12 Inspect, adjust, and replace transmission shift linkages, brackets, bearings, cables, pivots, and levers.
- 11.13 Inspect, replace, and align power train mounts.
- 11.14 Inspect and replace transmission gaskets, seals, and sealants; Inspect sealing surfaces.
- 11.15 Remove and reinstall transmission.
- 11.16 Disassemble, clean, and reassemble transmission components.
- 11.17 Inspect, adjust, and reinstall transmission shift cover, forks, grommets, levers, shafts, sleeves, detent mechanisms, interlocks, and springs.
- 11.18 Inspect and reinstall input (clutch) shaft and bearings.
- 11.19 Inspect and reinstall main shaft, gears, thrust washers, bearings, and retainers.
- 11.20 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
- 11.21 Inspect and reinstall counter (cluster) gear, shaft, bearings, thrust washers, and retainers; check end play; adjust as needed.
- 11.22 Inspect and reinstall reverse idler gear, shaft, bearings, thrust washers, and retainers; check end play; adjust as needed.
- 11.23 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 11.24 Inspect, repair, and replace extension housing and transmission case mating surfaces, bores, bushings, and vents.
- 11.25 Inspect lubrication devices (oil pump or slingers).
- 11.26 Achieve product specific certification for manual transmission systems.

### **Transaxle Diagnosis and Repair**

- 11.27 Diagnose transaxle noise, hard shifting, jumping out of gear, and fluid leakage problem; determine necessary action.
- 11.28 Inspect, adjust, and reinstall transaxle shift linkages, brackets, bushings, cables, pivots, and levers.

- 11.29 Inspect and reinstall power train mounts.
- 11.30 Remove and reinstall transaxle.
- 11.31 Inspect and replace transaxle gaskets, seals, and sealants; inspect sealing surfaces.
- 11.32 Remove and replace transaxle final drive.
- 11.33 Disassemble and clean transaxle final drive.
- 11.34 Inspect, adjust, and reinstall transaxle shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.
- 11.35 Inspect and reinstall input (clutch) shaft and bearings.
- 11.36 Inspect and reinstall output shaft, gears, thrust washers, bearings, and retainers.
- 11.37 Measure end play or preload (shim or spacer selection procedure) on transaxle shafts; adjust as needed.
- 11.38 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
- 11.39 Inspect and reinstall reverse idler gear, shaft, bearings, thrust washers, and retainers.
- 11.40 Inspect transaxle case, mating surfaces, bores, bushings, and vents.
- 11.41 Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 11.42 Diagnose differential assembly noise and vibration problems; determine necessary action.
- 11.43 Remove, inspect, measure, adjust, and reinstall differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.
- 11.44 Inspect lubrication devices (oil pump or slingers).
- 11.45 Achieve product specific certification for manual transaxle systems.

### **Drive and Half Shaft Universal and Constant-Velocity (CV) Joint Diagnosis and Repair**

- 11.46 Diagnose constant-velocity (CV) joint noise and vibration problems; determine necessary action.
- 11.47 Diagnose universal joint noise and vibration problems; determine necessary action.
- 11.48 Diagnose front wheel drive (FWD) front wheel bearing noise and vibration problems; determine necessary action.
- 11.49 Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
- 11.50 Inspect, service, and replace shaft center support bearings.
- 11.51 Check and correct shaft balance; measure shaft run out; measure and adjust driveline angles.

### **Rear Axle Diagnosis and Repair; Ring and Pinion Gears and Differential Case Assembly**

- 11.52 Diagnose noise and vibration problems; determine necessary action.
- 11.53 Diagnose fluid leakage problems; determine necessary action.
- 11.54 Inspect and replace companion flange and pinion seal; measure companion flange run out.
- 11.55 Inspect ring gear and measure run out; determine necessary action.
- 11.56 Remove and inspect drive pinion gear, spacers, sleeves, and bearings.
- 11.57 Measure and adjust drive pinion depth.
- 11.58 Measure and adjust drive pinion bearing preload.

- 11.59 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup and shim types).
- 11.60 Check ring and pinion tooth contact patterns; adjust as needed.
- 11.61 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
- 11.62 Reassemble and reinstall differential case assembly; measure run out; determine necessary action.
- 11.63 Achieve product specific certification for differentials.

### **Limited Slip Differential**

- 11.64 Diagnose noise, slippage, and chatter problems; determine necessary action.
- 11.65 Inspect and flush differential housing; refill with correct lubricant.
- 11.66 Inspect and reinstall clutch (cone or plate) components.
- 11.67 Measure rotating torque; determine necessary action

### **Axle Shaft**

- 11.68 Diagnose rear axle shafts, bearings, and seals for noise, vibration, and fluid leakage problems; determine necessary action.
- 11.69 Inspect and replace rear axle shaft wheel studs.
- 11.70 Remove and replace rear axle shafts.
- 11.71 Inspect and replace rear axle shaft seals, bearings, and retainers.
- 11.72 Measure rear axle flange run out and shaft end play; determine necessary action.

### **Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair**

- 11.73 Diagnose noise, vibration, and unusual steering problems; determine necessary action.
- 11.74 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
- 11.75 Remove and reinstall transfer case.
- 11.76 Disassemble, service, and reassemble transfer case and components.
- 11.77 Inspect, service, and replace front-wheel bearings and locking hubs.
- 11.78 Check drive assembly seals and vents; check lube level.
- 11.79 Inspect viscous coupling assembly.
- 11.80 Achieve product specific certification for all wheel drive systems.

## **12.0 Demonstrate proficiency in the operation of steering and suspension systems--The student will be able to:**

- 12.01 Disable supplemental restraint system (SRS) in accordance with manufacturer's procedures.
- 12.02 Diagnose steering column noises, looseness, and binding problems (including tilt mechanisms); determine necessary action.
- 12.03 Diagnose power non-rack and pinion steering gear binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine necessary action.
- 12.04 Diagnose power rack and pinion steering gear vibration, looseness, and hard steering problems; determine necessary action.

- 12.05 Inspect and replace steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel.
- 12.06 Adjust manual or power non-rack and pinion worm bearing preload and sector lash.
- 12.07 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.
- 12.08 Disassemble, inspect, repair, and reassemble rack and pinion steering gear.
- 12.09 Adjust manual or power rack and pinion steering gear.
- 12.10 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
- 12.11 Inspect manual and power steering fluid levels and condition.
- 12.12 Flush, fill, and bleed power steering system.
- 12.13 Diagnose power steering fluid leakage; determine necessary action.
- 12.14 Inspect, replace, and adjust power steering pump belt.
- 12.15 Remove, inspect, and replace power steering pump, pump mounts, pump seals, and gaskets.
- 12.16 Remove, inspect, and replace power steering pump pulley; check alignment.
- 12.17 Perform power steering system pressure test; determine needed repairs.
- 12.18 Inspect and replace power steering hoses and fittings.
- 12.19 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
- 12.20 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
- 12.21 Diagnose, inspect, adjust, repair or replace components of electronically-controlled steering systems.
- 12.22 Diagnose, inspect, repair or replace components of variable-assist steering systems.
- 12.23 Achieve product specific certification for power assisted steering systems.
- 12.24 Achieve product specific certification for variable assisted steering systems.

### **Suspension Systems Diagnosis and Repair; Front Suspensions**

- 12.25 Diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine necessary action.
- 12.26 Diagnose MacPherson strut suspension system noises body sway, and uneven riding height problems; determine necessary action.
- 12.27 Remove, inspect, and replace upper and lower control arms, bushings, shafts, and rebound bumpers.
- 12.28 Remove, inspect, replace, and adjust strut (compression/tension) rods and bushings.
- 12.29 Remove, inspect, and replace upper and lower ball joints on short and long arm suspension systems.
- 12.30 Remove, inspect, and replace steering knuckle assemblies.
- 12.31 Remove, inspect, and replace short and long arm suspension system coil springs and spring insulators.
- 12.32 Remove, inspect, replace, and adjust suspension system torsion bars; inspect mounts.
- 12.33 Remove, inspect and replace stabilizer bar bushings, brackets, and links.
- 12.34 Remove, inspect, and replace ball joints on MacPherson strut suspension systems.
- 12.35 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, insulators, and upper strut bearing mount.



- 12.36 Lubricate suspension and steering systems.
- 12.37 Service product specific suspension systems.

### **Rear Suspensions**

- 12.38 Remove, inspect, and replace coil springs and spring insulators.
- 12.39 Remove, inspect, and replace transverse links, control arms, bushings, and mounts.
- 12.40 Remove, inspect, and replace leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
- 12.41 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers).
- 12.42 Service product specific suspension systems.

### **Miscellaneous Service**

- 12.43 Inspect, remove, and replace shock absorbers.
- 12.44 Remove, inspect, and service or replace front and rear wheel bearings.
- 12.45 Diagnose, inspect, adjust, repair or replace components of electronically-controlled suspension systems.
- 12.46 Service product specific ride height control systems.

### **Wheel Alignment Diagnosis, Adjustment, and Repair**

- 12.47 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return problems; determine necessary action.
- 12.48 Measure vehicle riding height; determine necessary action.
- 12.49 Check and adjust front and rear wheel camber; determine needed repairs.
- 12.50 Check and adjust caster; determine necessary action.
- 12.51 Check and adjust front wheel toe; adjust as needed.
- 12.52 Center steering wheel.
- 12.53 Check toe-out-on-turns (turning radius); determine needed repairs.
- 12.54 Check SAI (steering axis inclination) and included angle; determine necessary action.
- 12.55 Check and adjust rear wheel toe.
- 12.56 Check rear wheel thrust angle; determine necessary action.
- 12.57 Check for front wheel setback; determine necessary action.
- 12.58 Check front cradle (subframe) alignment; determine needed repairs.

### **Wheel and Tire Diagnosis and Repair**

- 12.59 Diagnose tire wear patterns; determine necessary action.
- 12.60 Inspect tires; check and adjust air pressure.
- 12.61 Diagnose wheel/tire vibration, shimmy, and noise problems; determine necessary action.
- 12.62 Rotate tires according to manufacturer's recommendations.
- 12.63 Measure wheel, tire, axle, and hub run out; determine needed repairs.
- 12.64 Diagnose tire pull (lead) problem; determine corrective actions.
- 12.65 Balance wheel and tire assembly (static and dynamic).
- 12.66 Dismount, inspect, repair, and remount tire on wheel.
- 12.67 Reinstall wheel; torque lug nuts.

13.0 Demonstrate proficiency in the operation and servicing of automotive brake system--The student will be able to:

- 13.01 Measure and adjust pedal pushrod length and pedal height.
- 13.02 Check master cylinder for internal and external leaks and proper operation; determine necessary action.
- 13.03 Remove, bench bleed, and replace master cylinder.
- 13.04 Diagnose poor stopping, pulling or dragging caused by problems in the hydraulic system; determine necessary action.
- 13.05 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
- 13.06 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
- 13.07 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.
- 13.08 Select, handle, store, and install brake fluids to proper level.
- 13.09 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.
- 13.10 Inspect, test, replace, and adjust height (load) sensing proportioning valve.
- 13.11 Inspect, test, and replace components of brake warning light system.
- 13.12 Bleed (manual, pressure, vacuum or surge) brake system; flush hydraulic system.

**Drum Brake Diagnosis and Repair**

- 13.13 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation problems; determine necessary action.
- 13.14 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or replace as needed.
- 13.15 Mount brake drum on lathe machine braking surface.
- 13.16 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- 13.17 Remove and reinstall wheel cylinders.
- 13.18 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
- 13.19 Reinstall wheel, torque lug nuts, and make final checks and adjustments.

**Disc Brake Diagnosis and Repair**

- 13.20 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation caused problems; determine necessary action.
- 13.21 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing.
- 13.22 Clean and inspect caliper mounting and slides for wear and damage.
- 13.23 Remove, clean, and inspect pads and retaining hardware; determine needed service.
- 13.24 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.
- 13.25 Reassemble, lubricate, and reinstall caliper, pads, and related hardware.

- 13.26 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.
- 13.27 Refinish rotor according to manufacturer's recommendations.
- 13.28 Adjust calipers with integrated parking brake system.
- 13.29 Fill master cylinder with recommended fluid and seat pads; inspect caliper for leaks.
- 13.30 Reinstall wheel, torque lug nuts, and make final checks and adjustments.
- 13.31 Remove and replace rotor.

### **Power Assist Units Diagnosis and Repair**

- 13.32 Test pedal free travel with and without engine running; check power assist operation.
- 13.33 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
- 13.34 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; repair or replace parts as needed.

### **Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and Repair**

- 13.35 Diagnose wheel bearing noises, wheel shimmy, and vibration problems; determine necessary action.
- 13.36 Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings.
- 13.37 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed.
- 13.38 Check parking brake operation; adjust as needed.
- 13.39 Check operation of parking brake indicator light system.
- 13.40 Check operation of brake stop light system; adjust and service as needed.
- 13.41 Replace wheel bearing and race.

### **Anti-Lock Brake System**

- 13.42 Inspect, test, and service anti-lock brake system (ABS) hydraulic, electrical, and mechanical components.
- 13.43 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise problems caused by the anti-lock brake system (ABS); determine necessary action.
- 13.44 Observe anti-lock brake system (ABS) warning light(s) at startup; determine if further diagnosis is needed.
- 13.45 Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.
- 13.46 Depressurize high pressure components of the anti-lock brake system (ABS) following manufacturer's recommended safety procedures.
- 13.47 Fill the anti-lock brake system (ABS) master cylinder with recommended fluid following manufacturer's procedures; inspect system for leaks.
- 13.48 Bleed the anti-lock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures.

- 13.49 Perform a fluid pressure (hydraulic boost) diagnosis on the high pressure anti-lock brake system (ABS); determine necessary action.
  - 13.50 Remove and install anti-lock brake system (ABS) electrical/electronic/hydraulic components following manufacturer's procedures and specifications.
  - 13.51 Service, test, and adjust anti-lock brake system (ABS) speed sensors following manufacturer's recommended procedures.
  - 13.52 Diagnose anti-lock brake system (ABS) braking problems caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).
  - 13.53 Achieve product specific certification requirements for anti-lock brake systems.
  - 13.54 Service product specific anti-lock brake systems
  - 13.55 Service product specific traction control systems.
- 14.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic related components--The student will be able to:

- 14.01 Use wiring diagrams during diagnosis of electrical circuit problems.
- 14.02 Check electrical circuits with a test light; determine necessary action.
- 14.03 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine needed repairs.
- 14.04 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
- 14.05 Check electrical circuits using jumper wires; determine necessary action.
- 14.06 Find shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
- 14.07 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action.
- 14.08 Inspect and test fusible links, circuit breakers, and fuses; replace as needed.
- 14.09 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or replace as needed.

### **Battery Diagnosis and Service**

- 14.10 Perform battery state-of-charge test; determine needed service.
- 14.11 Perform battery capacity (load, high-rate discharge) test; determine needed service.
- 14.12 Maintain or restore electronic memory functions.
- 14.13 Inspect, clean, fill, and replace battery.
- 14.14 Perform slow/fast battery charge.
- 14.15 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
- 14.16 Start a vehicle using jumper cables and a battery or auxiliary power supply.

### **Starting System Diagnosis and Repair**

- 14.17 Perform starter current draw and circuit voltage drop test; determine necessary action
- 14.18 Inspect and test starter relays and solenoids; replace as needed.
- 14.19 Remove and replace/reinstall starter.
- 14.20 Perform starter bench tests; determine necessary action.
- 14.21 Inspect, test, and repair or replace switches, connectors, and wires of starter control circuits.

- 14.22 Disassemble, clean, inspect, and test starter components; replace as needed.

### **Charging System Diagnosis and Repair**

- 14.23 Diagnose charging system problems that cause an undercharge, a no-charge or an overcharge condition.
- 14.24 Inspect and adjust alternator drive belts; replace as needed.
- 14.25 Inspect and test voltage regulator; replace as needed.
- 14.26 Remove, inspect, and replace/reinstall alternator.
- 14.27 Disassemble, clean, inspect, and test alternator components; replace as needed.
- 14.28 Perform charging circuit voltage drop tests; determine needed repairs.

### **Lighting Systems Diagnosis and Repair**

- 14.29 Diagnose brighter than normal, intermittent, dim or no light operation.
- 14.30 Inspect, replace, and aim headlights and bulbs.
- 14.31 Inspect and diagnose incorrect turn signal or hazard light operation; repair or replace as needed.

### **Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair**

- 14.32 Diagnose intermediate, high, low or no gauge readings.
- 14.33 Test gauge circuit voltage regulators (limiters); replace as needed.
- 14.34 Inspect and test gauges and gauge sending units; replace as needed.
- 14.35 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or replace as needed.
- 14.36 Diagnose incorrect operation of warning devices and other driver information systems.
- 14.37 Diagnose intermediate, high, low or no readings on electronic instrument clusters.
- 14.38 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; repair or replace as needed.

### **Horn and Wiper/Washer Diagnosis and Repair**

- 14.39 Diagnose incorrect horn operation; repair as needed.
- 14.40 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; repair as needed.
- 14.41 Diagnose incorrect windshield washer operation; repair as needed.

### **Accessories Diagnosis and Repair**

- 14.42 Diagnose incorrect operation of motor-driven accessory circuits; repair as needed.
- 14.43 Diagnose incorrect heated glass operation; repair as needed.
- 14.44 Diagnose incorrect electric door and hatch/trunk lock operation; repair as needed.
- 14.45 Diagnose incorrect operation of cruise control systems; repair as needed.
- 14.46 Diagnose supplemental restraint system (SRS) problems; repair as needed. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment.)
- 14.47 Diagnose radio static and weak, intermittent, or no radio reception.

- 14.48 Achieve product specific certification requirements for electrical/electronic systems.
- 14.49 Service and repair product specific electrical/electronic systems.
- 14.50 Perform product specific diagnostic procedures.

15.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems--The student will be able to:

- 15.01 Diagnose unusual operating noises in the A/C system; determine necessary action.
- 15.02 Conduct a performance test of the A/C system; determine needed repairs.
- 15.03 Leak test a/c system; determine necessary action.
- 15.04 Inspect the condition of discharged oil.
- 15.05 Select oil type; measure and add oil to the A/C system as needed.

**Refrigeration System Component Diagnosis and Repair Compressor and Clutch**

- 15.06 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
- 15.07 Inspect A/C compressor drive belts; replace and adjust as needed.
- 15.08 Inspect, test, and replace A/C compressor clutch components or assembly.
- 15.09 Remove and replace A/C compressor and mountings.
- 15.10 Inspect and replace A/C compressor shaft seal assembly(ies).

**Evaporator, Receiver/Drier, Condenser, Etc.**

- 15.11 Diagnose A/C system problems caused by too much moisture in the refrigerant; determine necessary action.
- 15.12 Install A/C system filter.
- 15.13 Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; replace as needed.
- 15.14 Inspect A/C condenser for air flow restrictions; service as required.
- 15.15 Inspect receiver/drier or accumulator/drier; replace as needed.
- 15.16 Inspect and test expansion valve or orifice (expansion) tube; replace as needed.
- 15.17 Inspect evaporator housing water drain; repair as needed.

**Heating and Engine Cooling Systems Diagnosis and Repair**

- 15.18 Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
- 15.19 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.
- 15.20 Inspect engine cooling and heater system hoses and belts; replace as needed.
- 15.21 Inspect, test, and replace thermostat and housing.
- 15.22 Determine coolant condition; drain and recover.
- 15.23 Flush system and refill with recommended coolant; bleed system.
- 15.24 Clean, inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; replace as needed.
- 15.25 Inspect and test heater control valve(s); replace as needed.

**Operating Systems and Related Controls Diagnosis and Repairs**

- 15.26 Diagnose failures in the electrical controls of heating and A/C systems; determine necessary action.
- 15.27 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; repair as needed.
- 15.28 Test A/C compressor load cut-off systems; determine needed repairs.

### **Vacuum/Mechanical**

- 15.29 Diagnose failure in the vacuum and mechanical controls of the heating and A/C system; determine necessary action.
- 15.30 Inspect and test A/C-heater control panel assembly; replace as needed.
- 15.31 Inspect and test A/C-heater control cables and linkages adjust or replace as needed.
- 15.32 Inspect and test A/C-heater vacuum control switches, hoses, diaphragms (motor), vacuum reservoir, check valve, and restrictors; replace as needed.
- 15.33 Inspect and test A/C-heater ducts, doors, hoses, and outlets; replace as needed.

### **Automatic and Semi-Automatic Temperature Controls**

- 15.34 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

### **Refrigerant Recovery, Recycling, and Handling**

- 15.35 Verify correct operation and maintenance of refrigerant handling equipment.
- 15.36 Identify and recover A/C system refrigerant.
- 15.37 Recycle refrigerant.
- 15.38 Label and store refrigerant.
- 15.39 Test recycled refrigerant for non-condensable gases.
- 15.40 Evaluate and charge A/C system.
- 15.41 Achieve product specific certification requirements for climate control systems.
- 15.42 Service product specific climate control systems.

## 16.0 Demonstrate proficiency in engine performance services--The student will be able to:

- 16.01 Interpret and verify complaint; determine necessary action.
- 16.02 Demonstrate proficiency in use of computer-based information systems.
- 16.03 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 16.04 Diagnose unusual engine noise or vibration problems; determine necessary action.
- 16.05 Diagnose unusual exhaust color, odor, and sound; determine needed action.
- 16.06 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- 16.07 Perform cylinder power balance test; determine needed action.
- 16.08 Perform cylinder compression test; determine needed action.
- 16.09 Perform cylinder leakage test; determine needed action.
- 16.10 Diagnose engine mechanical, electrical, electronic, fuel and ignition problems with an oscilloscope and engine diagnostic equipment; determine needed action.

- 16.11 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine needed action.

### **Computerized Engine Controls Diagnosis and Repair**

- 16.12 Diagnose emissions or driveability problems resulting from of computerized engine controls with no diagnostic trouble codes stored; determine necessary action.
- 16.13 Retrieve and record stored diagnostic trouble codes.
- 16.14 Diagnose the causes of emissions or driveability problems resulting from failure of computerized engine controls with stored diagnostic trouble codes.
- 16.15 Inspect, test, adjust, and replace computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits.
- 16.16 Obtain and interpret digital multimeter (DMM) readings.
- 16.17 Access and use electronic service information (ESI).
- 16.18 Locate and interpret vehicle and major component identification number (VIN, vehicle certification labels and calibration decals).
- 16.19 Inspect and test power and ground circuits and connections; service or replace as needed.
- 16.20 Practice recommended precautions when handling static sensitive devices.
- 16.21 Diagnose driveability and emissions problems resulting from failures of interrelated systems (cruise control, security alarms, torque controls, suspension controls, traction controls, torque management, A/C, automatic transmissions, and similar systems); determine necessary action.
- 16.22 Achieve product specific certification requirements for diagnostic scanner.
- 16.23 Achieve product specific certification requirements for PROM reprogramming systems.
- 16.24 Perform product specific OBD II drive cycle diagnostic tests.

### **Ignition System Diagnosis and Repair**

- 16.25 Diagnose no-starting, driveability, and emissions problems on vehicles with electronic ignition (distributorless) systems; determine necessary action.
- 16.26 Diagnose no-starting, driveability, and emissions problems on vehicles with distributor ignition (DI) systems; determine needed repairs.
- 16.27 Inspect and test ignition primary circuit wiring and components; repair or replace as needed.
- 16.28 Inspect and test distributor; service as needed.
- 16.29 Inspect and test ignition system secondary circuit wiring and components; replace as needed.
- 16.30 Inspect and test ignition coil(s); replace as needed.
- 16.31 Check and adjust (where applicable) ignition system timing and timing advance/retard.
- 16.32 Inspect and test ignition wiring harness and connectors; replace as needed.
- 16.33 Inspect and test ignition system pick-up sensor or triggering devices; replace as needed.
- 16.34 Inspect and test ignition control module; replace as needed.
- 16.35 Achieve product specific certification requirements for specific ignition systems.
- 16.36 Service product specific ignition systems.

### **Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair**



- 16.37 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine needed action.
- 16.38 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel system; determine needed action.
- 16.39 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
- 16.40 Check fuel for contaminants and quality.
- 16.41 Inspect and test mechanical and electrical fuel pumps and pump control systems; replace as needed.
- 16.42 Replace fuel filters.
- 16.43 Inspect and test fuel pressure regulation system and components.
- 16.44 Inspect and test cold enrichment system components; adjust or replace as needed.
- 16.45 Remove, clean, and reinstall throttle body; adjust related linkages
- 16.46 Inspect and test fuel injectors; clean and replace.
- 16.47 Inspect throttle body mounting plates, air induction and filtration system, intake manifold, and gaskets; clean or replace as needed.
- 16.48 Check/adjust idle speed and fuel mixture where applicable.
- 16.49 Remove, inspect, and test vacuum and electrical components and connections of fuel system; repair or replace as needed.
- 16.50 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.
- 16.51 Perform exhaust system back-pressure test; determine needed action.
- 16.52 Test the operation of turbocharger/supercharger systems; determine needed action.
- 16.53 Remove, clean, inspect, and repair or replace turbocharger/supercharger system components.
- 16.54 Identify the causes of turbocharger/supercharger failure; determine needed action.
- 16.55 Achieve product specific certification requirements for fuel injection systems.
- 16.56 Service product specific fuel injection systems.

### **Emissions Control Systems Diagnosis and Repair Positive Crankcase Ventilation**

- 16.57 Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system.
- 16.58 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.

### **Exhaust Gas Recirculation**

- 16.59 Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system.
- 16.60 Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; service or replace as needed.
- 16.61 Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; service or replace as needed.
- 16.62 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; repair or replace as needed.

### **Exhaust Gas Treatment**

- 16.63 Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems.
- 16.64 Inspect and test mechanical components of secondary air injection systems; service or replace as needed.
- 16.65 Inspect and test electrical/electronically-operated components and circuits of air injection systems; replace as needed.
- 16.66 Inspect and test components of catalytic converter systems; replace as needed.

### **Intake Air Temperature Controls**

- 16.67 Diagnose emissions and driveability problems resulting from failure of the intake air temperature control systems.
- 16.68 Inspect and test components of intake air temperature control systems; replace as needed.

### **Early Fuel Evaporation (Intake Manifold Temperature) Controls**

- 16.69 Diagnose emissions and driveability problems resulting from failure of early fuel evaporation control systems.
- 16.70 Inspect and test components of early fuel evaporation control systems; service or replace as needed.

### **Evaporative Emissions Controls**

- 16.71 Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system.
- 16.72 Inspect and test components and hoses of evaporative emissions control system; replace as needed.

### **Engine Related Service**

- 16.73 Adjust valves on engines with mechanical or hydraulic lifters
- 16.74 Verify correct camshaft timing; determine needed action.
- 16.75 Verify engine operating temperature; determine needed action.
- 16.76 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or replace as needed.
- 16.77 Inspect and test thermostat, by-pass, and housing; replace as needed.
- 16.78 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or replace as needed.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Professional Pilot Technology  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>AS</b>	<b>AAS</b>
CIP Number	1649010200	0649010200
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	53-2011	53-2011
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fl DOE.org/workforce/perkins/perkins_resources.asp">http://www.fl DOE.org/workforce/perkins/perkins_resources.asp</a>	

### **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 purpose of this program is to prepare students for initial employment with occupational titles as aircraft pilot, airplane pilot, commercial (SOC 53-2012), or to provide supplemental training for persons previously or currently employed in these occupations.

The content includes but is not limited to, communications skills, leadership skills, human relations and employability skills, safe and efficient work practices, Federal Aviation Administration pilot certification procedures, aircraft systems and components, flight safety, physics and aerodynamics, and instrumentation.

### **Program Structure**

This program is a planned sequence of instruction consisting of 64 credit hours.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

Prior to beginning flight training, students will be required to pass a flight physical from an FAA approved medical examiner. Community Colleges initiating this program are strongly encouraged to visit existing Florida Community Colleges with active programs.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

## **Standards**

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

- 01.0 Demonstrate an understanding of safe and effective work practices.
- 02.0 Demonstrate an understanding of fundamentals of flight.
- 03.0 Understand and explain pertinent Federal Aviation Administration regulations.
- 04.0 Demonstrate understanding of meteorology.
- 05.0 Demonstrate knowledge of aircraft communications equipment.
- 06.0 Demonstrate knowledge and an understanding of aircraft propulsion, and associated systems.
- 07.0 Demonstrate an understanding of navigation systems and procedures.
- 08.0 Demonstrate flight planning skills.
- 09.0 Demonstrate effective communication skills.
- 10.0 Demonstrate analytical skills.
- 11.0 Demonstrate understanding of applied sciences.
- 12.0 Demonstrate employability skills.
- 13.0 Demonstrate aircraft operations.
- 14.0 Demonstrate an understanding of the fundamentals of flight instruction

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Professional Pilot Technology  
**CIP Numbers:** 1649010200 AS/ 649010200 AAS  
**Program Length:** 64 credit hours  
**SOC Code(s):** 53-2011

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Demonstrate an understanding of safe and effective work practices--The student will be able to:

- 01.01 Demonstrate an awareness and understanding of health and safety hazards, prevention and correction of environmental problems and know the solutions unique to the industry.
- 01.02 Demonstrate an awareness and understanding of fueling operations.
- 01.03 Demonstrate an understanding of situation awareness.
- 01.04 Demonstrate an awareness and understanding of fire hazards and the ability to control and extinguish fires.
- 01.05 Demonstrate an awareness and understanding for the need of safety devices, controls, guards and equipment.

02.0 Demonstrate an understanding of fundamentals of flight--The student will be able to:

- 02.01 State and give examples of Newton's three laws of motion.
- 02.02 Name and compare the four forces of flight.
- 02.03 Describe an airfoil.
- 02.04 Tell how lift is produced.
- 02.05 Discuss how and why an airplane stalls and spins.
- 02.06 Describe and explain how pitot/static vacuum, pressure and engine instruments work.
- 02.07 Explain the aircraft design performance and operation.

03.0 Understand and explain federal aviation administration regulations--The student will be able to:

- 03.01 Explain major portion of Parts 1, 61, 67, 91, 121, 125, 135, 141 and NTSB of the Federal Aviation Regulations.

04.0 Demonstrate understanding of meteorology--The student will be able to:

- 04.01 Describe the composition, circulation and stability of the atmosphere.
- 04.02 Demonstrate an understanding of air mass development, the movement of fronts and their effect on aviation.
- 04.03 Demonstrate an awareness of weather hazards to aviation and an understanding of how to avoid them.

- 04.04 Demonstrate the ability to access weather information prior to and during flights through a variety of media.
- 04.05 Interpret printed reports, forecasts and graphic weather products.
- 05.0 Demonstrate knowledge of aircraft communication equipment--The student will be able to:
  - 05.01 Use and explain aircraft voice communication equipment.
  - 05.02 Explain function and use of ELT's, voice recorders, and other emergency communication systems.
  - 05.03 Demonstrate use of proper phraseology in ATC communications.
  - 05.04 Discuss uses and limitations of portable transceivers.
  - 05.05 Demonstrate use of phonetic alphabet.
- 06.0 Demonstrate knowledge and understanding of aircraft propulsion and associated systems--The student will be able to:
  - 06.01 Describe and identify reciprocating and turbine engine components.
  - 06.02 Describe a typical cooling system.
  - 06.03 Describe and sketch a basic float type carburetor.
  - 06.04 Describe the advantages of a fuel-injected engine.
  - 06.05 Describe a typical lubrication system.
  - 06.06 Describe a typical magneto ignition system, including proper magneto checks.
  - 06.07 Describe the difference between a normally aspirated engine and one that is supercharged or turbocharged.
  - 06.08 Demonstrate basic operation of an aircraft engine, including proper interpretation of instruments and operation of throttle, mixture control, carburetor heat control
- 07.0 Demonstrate an understanding of navigation systems and procedures--The student will be able to:
  - 07.01 Define radio navigation.
  - 07.02 Explain the magnetic compass.
  - 07.03 Describe and demonstrate VOR equipment and navigation.
  - 07.04 Describe and demonstrate the ADF equipment and navigation.
  - 07.05 Describe and demonstrate GPS equipment and navigation
  - 07.06 Explain DME and RNAV principles.
  - 07.07 Demonstrate the use of a flight computer.
  - 07.08 Explain sectional charts and their use.
  - 07.09 Explain en route and terminal charts and approach plate.
  - 07.10 Explain lost communications emergency procedures VFR and IFR.
  - 07.11 Read and interpret aircraft performance charts.
  - 07.12 Plot and explain a cross-country course.
  - 07.13 Describe the FAA national airspace system.
  - 07.14 Define DP's and STAR's.
- 08.0 Demonstrate flight planning skills--The student will be able to:
  - 08.01 Explain major portions of Parts 1, 61, 67, 91 and 830 of the Federal Aviation Rules and Regulations.
  - 08.02 Define weight and balance.

- 08.03 Define center of gravity, moment, datum line, CF envelope basic empty weight and gross weight.
  - 08.04 Solve given weight and balance problems.
  - 08.05 Determine route of flight.
  - 08.06 Demonstrate acquisition of appropriate weather data.
  - 08.07 Demonstrate proper selection of destination/enroute/alternate airports.
  - 08.08 Explain fuel requirements.
  - 08.09 Calculate and compute weight/balance.
  - 08.10 Calculate aircraft performance.
  - 08.11 Access and analyze NOTAMS.
  - 08.12 Acquire and define mission profile.
  - 08.13 Demonstrate and explain a flight log.
  - 08.14 Demonstrate methods in VFR/IFR flight plans.
- 09.0 Demonstrate effective communication skills--The student will be able to:
- 09.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 09.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 09.03 Read and follow written and oral English instructions.
  - 09.04 Answer and ask questions coherently and concisely.
  - 09.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 09.06 Demonstrate telephone/communication skills.
  - 09.07 Demonstrate knowledge and use of appropriate computer skills.
  - 09.08 Demonstrate interpersonal skills.
- 10.0 Demonstrate analytical skills--The student will be able to:
- 10.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 10.02 Add, subtract, multiply and divide using fractions, decimals, whole numbers, percentages, and ratios.
  - 10.03 Demonstrate understanding and use of the metric system.
- 11.0 Demonstrate understanding of applied sciences--The student will be able to:
- 11.01 Draw conclusions or make inferences from data.
  - 11.02 Understand pressure measurement in terms of P.S.I., inches of mercury, and metric.
- 12.0 Demonstrate employability skills--The student will be able to:
- 12.01 Obtain FAA commercial pilot certification with instrument rating.
  - 12.02 Obtain FAA flight instructor pilot certification with instrument rating.
- 13.0 Demonstrate aircraft operations--The student will be able to:
- 13.01 Demonstrate the operation of aircraft in accordance with FARs and AFMS.
  - 13.02 Identify specific aircraft handling characteristics.



- 13.03 Explain Crew Resource Management.
  - 13.04 Demonstrate proper passenger briefing procedures.
  - 13.05 Demonstrate post-operation report completion.
  - 13.06 Demonstrate situation awareness.
  - 13.07 Demonstrate correct decision-making skills.
- 14.0 Demonstrate an understanding of the fundamentals of flight instruction--The student will be able to:
- 14.01 Understand human behavior as it relates to aviation
  - 14.02 Understand the learning process as it relates to flight training
  - 14.03 Use effective communications
  - 14.04 Understand the teaching process
  - 14.05 Effectively use assessment tools
  - 14.06 Describe techniques of instruction
  - 14.07 Understand and describe risk management
  - 14.08 Plan instructional activities and prepare a lesson plan

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Commercial Pilot  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0649010202
Program Type	College Credit Certificate (CCC)
Program Length	24 Credits
CTSO	SkillsUSA
SOC Codes (all applicable)	53-2012
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Professional Pilot Technology AS/AAS degree program (0649010200).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 communications skills, employability skills, safe and efficient work practices, FAA pilot certification procedures, aircraft systems and components, flight safety, and instrumentation. This program focuses on specific, transferable skills. It stresses understanding and demonstration of the following elements of the commercial pilot industry: flight planning, managing commercial flight operations, flight safety and environmental issues.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

This course provides an expedited method of transition from an academic institution into the workforce. There are a number of students who wish to pursue their FAA licenses but do not want to seek a degree. Formalized training in an institution such as Palm Beach Community College leads to safer pilot practices as demonstrated by statistical data. The Commercial Pilot Certificate supports entry level job functions in the pilot industry. The typical length of this program for the average achieving student is nine calendar months.

Prior to beginning flight training, students will be required to pass a flight physical from an FAA approved medical examiner. Students are also required to meet the requirements for TSA approval (Transportation Security Administration) before beginning flight training activity. Community Colleges initiating this program are strongly encouraged to visit existing Florida Community Colleges with similar active programs.

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate an understanding of safe and effective work practices.
- 02.0 Demonstrate an understanding of fundamentals of flight.
- 03.0 Understand and explain pertinent Federal Aviation Administration regulations.
- 04.0 Demonstrate understanding of meteorology.
- 05.0 Demonstrate knowledge of aircraft communications equipment.
- 06.0 Demonstrate knowledge and an understanding of aircraft propulsion, and associated systems.
- 07.0 Demonstrate an understanding of navigation systems and procedures.
- 08.0 Demonstrate flight planning skills.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Commercial Pilot  
**CIP Number:** 0649010202  
**Program Length:** 24 Credit Hours  
**SOC Code(s):** 53-2012

This certificate program is part of the Professional Pilot Technology AS/AAS degree program (0649010200). At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of safe and effective work practices—The student will be able to:
- 01.01 Demonstrate an awareness and understanding of health and safety hazards, prevention and correction of environmental problems and know the solutions unique to the industry.
  - 01.02 Demonstrate an awareness and understanding of fueling operations.
  - 01.03 Demonstrate an understanding of situation awareness.
  - 01.04 Demonstrate an awareness and understanding of fire hazards and the ability to control and extinguish fires.
  - 01.05 Demonstrate an awareness and understanding for the need of safety devices, controls, guards and equipment.
- 02.0 Demonstrate an understanding of fundamentals of flight—The student will be able to:
- 02.01 State and give examples of Newton's three laws of motion.
  - 02.02 Name and compare the four forces of flight.
  - 02.03 Describe an airfoil.
  - 02.04 Tell how lift is produced.
  - 02.05 Discuss how and why an airplane stalls and spins.
  - 02.06 Describe and explain how pitot/static vacuum, pressure and engine instruments work.
  - 02.07 Explain the aircraft design performance and operation.
- 03.0 Understand and explain federal aviation administration Regulations—The student will be able to:
- 03.01 Explain major portion of Parts 1, 61, 67, 91, 135 and NTSB of the Federal Aviation Regulations.
- 04.0 Demonstrate understanding of meteorology—The student will be able to:
- 04.01 Describe the composition, circulation and stability of the atmosphere.
  - 04.02 Demonstrate an understanding of air mass development, the movement of fronts and their effect on aviation.
  - 04.03 Demonstrate an awareness of weather hazards to aviation and an understanding of how to avoid them.
  - 04.04 Demonstrate the ability to access weather information prior to and during flights through a variety of media.

- 04.05 Interpret printed reports, forecasts and graphic weather products.
- 05.0 Demonstrate knowledge of aircraft communication equipment—The student will be able to:
  - 05.01 Use and explain aircraft voice communication equipment.
  - 05.02 Explain function and use of ELT's, voice recorders, and other emergency communication systems.
  - 05.03 Demonstrate use of proper phraseology in ATC communications.
  - 05.04 Discuss uses and limitations of portable transceivers.
  - 05.05 Demonstrate use of phonetic alphabet.
- 06.0 Demonstrate knowledge and understanding of aircraft Propulsion and associated systems—The student will be able to:
  - 06.01 Describe and identify reciprocating and turbine engine components.
  - 06.02 Describe a typical cooling system.
  - 06.03 Describe and sketch a basic float type carburetor.
  - 06.04 Describe the advantages of a fuel-injected engine.
  - 06.05 Describe a typical lubrication system.
  - 06.06 Describe a typical magneto ignition system, including proper magneto checks.
  - 06.07 Describe the difference between a normally aspirated engine and one that is supercharged or turbocharged.
  - 06.08 Demonstrate basic operation of an aircraft engine, including proper interpretation of instruments and operation of throttle, mixture control, carburetor heat control
- 07.0 Demonstrate an understanding of navigation systems and procedures—The student will be able to:
  - 07.01 Define radio navigation.
  - 07.02 Explain the magnetic compass.
  - 07.03 Describe and demonstrate VOR equipment and navigation.
  - 07.04 Describe and demonstrate the ADF equipment and navigation.
  - 07.05 Describe and demonstrate GPS equipment and navigation
  - 07.06 Explain DME and RNAV principles.
  - 07.07 Demonstrate the use of a flight computer.
  - 07.08 Explain sectional charts and their use.
  - 07.09 Explain en route and terminal charts and approach plate.
  - 07.10 Explain lost communications emergency procedures VFR and IFR.
  - 07.11 Read and interpret aircraft performance charts.
  - 07.12 Plot and explain a cross-country course.
  - 07.13 Describe the FAA national airspace system.
  - 07.14 Define DP's and STAR's.
- 08.0 Demonstrate flight planning skills—The student will be able to:
  - 08.01 Explain major portions of Parts 1, 61, 67, 91 and 830 of the Federal Aviation Rules and Regulations.
  - 08.02 Define weight and balance.
  - 08.03 Define center of gravity, moment, datum line, CF envelope basic empty weight and gross weight.

- 08.04 Solve given weight and balance problems.
- 08.05 Determine route of flight.
- 08.06 Demonstrate acquisition of appropriate weather data.
- 08.07 Demonstrate proper selection of destination/enroute/alternate airports.
- 08.08 Explain fuel requirements.
- 08.09 Calculate and compute weight/balance.
- 08.10 Calculate aircraft performance.
- 08.11 Access and analyze NOTAMS.
- 08.12 Acquire and define mission profile.
- 08.13 Demonstrate and explain a flight log.
- 08.14 Demonstrate methods in VFR/IFR flight plans.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Aviation Operations  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>AS</b>	<b>AAS</b>
CIP Number	1649010400	0649010400
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	53-2022	53-2022
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	

### **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, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, technical writing, records management, security, Federal Aviation Administration regulations, data processing, and air cargo transportation.

### **Program Structure**

This program is a planned sequence of instruction consisting of 64 credit hours.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

The purpose of this program is to prepare students for initial employment as communication, transportation, utility management, air station managers or provide supplemental training for persons previously or currently employed in these occupations.

Engineering/architecture scale, friction measurement equipment, compass, weather equipment, UNICOM/radio equipment, fuel equipment (mobile and fixed), fire extinguishing equipment, firearms, aircraft tug, personal protective equipment, aeronautical charts and adverse weather gear.

The American Association of Airport Executives, National Air Transportation Association (NATA), National Association of State Aviation Officials (NASAO), and Florida Department of Transportation – Aviation Office (FDOT) are additional organizations for providing leadership training and for reinforcing specific skills. Organizations for students such as those mentioned, when provided shall be an integral part of the vocational instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.064, FAC.

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).



## **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

## **Standards**

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

- 01.0 Demonstrate understanding of safe and efficient work practices.
- 02.0 Demonstrate understanding of federal and state security procedures.
- 03.0 Demonstrate appropriate math skills.
- 04.0 Demonstrate understanding of Federal Aviation Administration, state and other governmental laws, rules and policies.
- 05.0 Demonstrate understanding of business law and management pertaining to aeronautics.
- 06.0 Demonstrate understanding of personnel management.
- 07.0 Demonstrate understanding of aviation safety and accident prevention and investigation.
- 08.0 Demonstrate appropriate communication skills.
- 09.0 Prepare, analyze and evaluate technical reports and data.
- 10.0 Maintain personnel records and budgets.
- 11.0 Evaluate facility maintenance problems and prescribe corrective action.
- 12.0 Demonstrate appropriate understanding of basic science.
- 13.0 Demonstrate employability skills.
- 14.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Aviation Operations  
**CIP Numbers:** 1649010400 AS, 0649010400 AAS  
**Program Length:** 64 credit hours  
**SOC Code(s):** 53-2022

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of safe and efficient work practices--The student will be able to:
- 01.01 Demonstrate an awareness and understanding of health and safety hazards, prevention and correction of ecological problems and know the solutions unique to the industry.
  - 01.02 Demonstrate an awareness and understanding of fueling hazards.
  - 01.03 Demonstrate an awareness and understanding of physical hazards.
  - 01.04 Demonstrate an awareness and understanding of fire hazards.
  - 01.05 Demonstrate an awareness of and the ability to control and extinguish fires.
  - 01.06 Demonstrate an awareness and understanding of the need for safety devices, controls, guards and equipment.
  - 01.07 Demonstrate awareness, understanding and use of personal safety devices such as goggles, masks, helmets, hearing protectors, air respirators and protective clothing.
- 02.0 Demonstrate understanding of federal and state security procedures--The student will be able to:
- 02.01 Describe passenger security systems in use.
  - 02.02 Describe and define federal security laws.
  - 02.03 Identify local law enforcement agencies.
  - 02.04 List known security risk features.
  - 02.05 Describe cargo theft precautions in use at facility.
  - 02.06 Describe the International Air Transport Association.
  - 02.07 List the more common labels found in the Restricted Articles Regulations: as published in bulletins by IATA.
- 03.0 Demonstrate appropriate math skills--The student will be able to:
- 03.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 03.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 03.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 03.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.

- 03.05 Demonstrate an understanding of federal, state and local taxes and their computation.
  
- 04.0 Demonstrate understanding of federal aviation administration, state and other governmental laws, rules and policies--The student will be able to:
  - 04.01 Describe the economic, social and political importance of commercial aviation, general aviation and aircraft manufacturing in the United States.
  - 04.02 Describe the function, basic organization and responsibility of the National Transportation Safety Board.
  - 04.03 Explain major portions of Parts 1, 61, 67, 77, 91, 830 and FAR Parts 108 and 139 of the Federal Aviation Regulations.
  - 04.04 List and describe the federal statutes pertaining to the economic regulation of the airline industry.
  - 04.05 List and describe the major federal statutes pertaining to the regulation of aviation safety.
  - 04.06 Describe the historical and current relationship between the U.S. Post Office and the aviation industry.
  - 04.07 List and describe six categories of general aviation.
  - 04.08 Describe the development of aviation laws and their analogy to the Law of the Sea.
  - 04.09 Explain the Department of Transportation, State of Florida, and its structure as relates to the aircraft industry.
  
- 05.0 Demonstrate understanding of business law and management pertaining to aeronautics--The student will be able to:
  - 05.01 Describe and identify in what manner and under what conditions an airport may be exposed to a lawsuit.
  - 05.02 Discuss the fundamental aspects of several categories of law that may affect the company because of its activities.
  - 05.03 State the fundamental principles of torts, contracts, bailments, labor agency negligence, product liability, partnerships, and corporations.
  - 05.04 Explain how an employee's action or inaction may subject the aviation company or airport to a lawsuit involving one or more of the several categories of law.
  
- 06.0 Demonstrate understanding of personnel management--The student will be able to:
  - 06.01 Name and describe the basic guides in personnel management.
  - 06.02 Discuss governmental relations in personnel management.
  - 06.03 Explain the general nature of personnel problems, and approaches to problem solving.
  - 06.04 State the general nature of job and personnel requirements; also technical and managerial employee requirements.
  - 06.05 Demonstrate knowledge of the importance and scope of education; also the role of communication and the fundamental rules of communication.
  - 06.06 Discuss the significance of remuneration and its problems, both economic and non-economic.
  - 06.07 Describe training and education aspects of company programs.
  - 06.08 State the role and purpose of interviewing and counseling.

- 06.09 Name and describe the rules/regulations associated with Americans with Disabilities Act.
- 07.0 Demonstrate understanding of aviation safety, accident prevention and investigation –  
The student will be able to:
- 07.01 Describe and explain the complete regulation that is currently exercised by the Federal government in the field of safety and investigation.
  - 07.02 State and discuss the portion of the Federal Aviation Act of 1958 as amended, which is generally described as Title VI, Safety Regulations of Civil Aeronautics.
  - 07.03 Demonstrate knowledge of the minimum standards governing design, materials workmanship, performance of aircraft, inspection, servicing, overhaul of aircraft, and parts and appliances, equipment and facilities, as required by section 601(a) of Federal Aviation Act of 1958 Section 601(a).
  - 07.04 Discuss the maximum hours of service for airmen and other employees, and other practices, methods, and procedures as required by Section 601(a) of the Federal Aviation Act of 1958.
  - 07.05 Explain the Federal Aviation Regulations (FAR's) promulgated by the Administrator to implement the authority granted by the Federal Aviation Act of 1958, in the area of safety, and to prevent accidents.
- 08.0 Demonstrate appropriate communication skills--The student will be able to:
- 08.01 Write logical and understandable statements, or phrases, to complete with accuracy the forms/invoices commonly used in business and industry.
  - 08.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 08.03 Read and follow written and oral instructions.
  - 08.04 Answer and ask questions coherently and concisely.
  - 08.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 08.06 Demonstrate appropriate telephone/communication skills.
- 09.0 Prepare, analyze and evaluate technical reports and data--The student will be able to:
- 09.01 State the five basic guidelines for preparation of technical reports.
  - 09.02 Compare the difference between technical and literary description.
  - 09.03 Describe the techniques used in technical report writing.
  - 09.04 Discuss the arrangement of the technical written report – such as cause and effect, inductive and deductive, enumeration and classification, problems and solution.
  - 09.05 Explain the preparatory work or stages in the process, such as the writing, the drafts, use of the library, and polishing style.
  - 09.06 List types of reports, and describe use of illustrations.
  - 09.07 Discuss the steps in developing an oral presentation.
- 10.0 Maintain personnel records and budgets--The student will be able to:
- 10.01 State the scope of section procedures.
  - 10.02 Describe the nature of the information gather about candidates.
  - 10.03 Explain the process of interpreting the findings and making of decisions.

- 10.04 Understand the need for keeping accurate reports and records for candidates rejected, and candidates accepted.
  - 10.05 State the objectives of the personnel program as related to the overall objectives of the company, whether the company provides a service or a product.
  - 10.06 Discuss the specific statistical goals sought and tasks to be undertaken by the personnel department, such as the number of people to be hired, types of personnel, grievance or bargaining sessions, anticipated worker accidents or illnesses.
  - 10.07 Calculate the staff necessary to attain goals; and equipment and resources they will require.
  - 10.08 Explain how the requirements to attain the stated company goals will necessitate the allocation of the stated budget in order to implement the requisite program.
- 11.0 Evaluate facility maintenance problems and prescribe corrective action--The student will be able to:
- 11.01 Describe and explain the complete regulation that is currently exercised by the Federal government in the field of safety, and maintenance.
  - 11.02 Demonstrate knowledge of the minimum standard for work practices including methods and procedures as required by Section 601(a) of the Federal Aviation Act of 1958.
  - 11.03 Explain the Federal Aviation Regulations (FAR's) promulgated by the Administrator to implement the authority granted by the Federal Aviation Act of 1958.
  - 11.04 State the procedures and practices in conformity with the FAR's when FAA inspectors review the company practices.
- 12.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 12.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 12.02 Draw conclusions or make inferences from data.
  - 12.03 Identify health-related problems, which may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 12.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 13.0 Demonstrate employability skills--The student will be able to:
- 13.01 Conduct a job search.
  - 13.02 Secure information about a job.
  - 13.03 Identify documents which may be required when applying for a job interview.
  - 13.04 Complete a job application form correctly.
  - 13.05 Demonstrate competence in job interview techniques.
  - 13.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 13.07 Identify acceptable work habits.
  - 13.08 Demonstrate knowledge of how to make appropriate job changes.
  - 13.09 Demonstrate acceptable employee health habits.

13.10 Demonstrate knowledge of the “Federal Right-To-Know Law” as recorded in Federal Statutes 29 CFR-1910, 1200.

14.0 Demonstrate an understanding of entrepreneurship--The student will be able to:

14.01 Define entrepreneurship.

14.02 Describe the importance of entrepreneurship to the American economy.

14.03 List the advantages and disadvantages of business ownership.

14.04 Identify the risks involved in ownership of a business.

14.05 Identify the necessary personal characteristics of a successful entrepreneur.

14.06 Identify the business skills needed to operate a small business efficiently and effectively.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Aviation Maintenance Management  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>AS</b>	<b>AAS</b>
CIP Number	1649010401	0649010401
Program Type	College Credit	College Credit
Standard Length	83 credit hours	83 credit hours
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3011	49-3011
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	

### **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 the Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for a mechanic certificate and rating(s). Instruction is designed to qualify students for Federal Aviation Administration (FAA) examinations for aviation maintenance powerplant and airframe technician certification as prescribed by FAR 147. The program content should also include training in communication, management leadership, human relations, supervisory and employability skills; and safe, efficient work practices.

### **Program Structure**

This program is a planned sequence of instruction consisting of 83 credit hours.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for employment as aircraft mechanics (SOC 49-3011), aircraft maintenance supervisors, or aviation maintenance managers. Graduates will be eligible to pursue FAA certification as airframe and powerplant mechanics and will be trained to troubleshoot maintenance problems and supervise mechanics in the aviation industry. This program also provides supplemental training for persons previously or currently employed in this occupation.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Aviation industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues. Since 83 credit hours are required in this curriculum, two summer terms will probably be required to complete the program within two years. Consideration should be given to making one or both summer terms a hands-on cooperative work experience for 5 credit hours.

An important note to consider is that each FAR PART 147 school must be approved by the FAA before any students can be placed in the program.

Required FAA exams include GENERAL written, oral, and practical; AIRFRAME written, oral, and practical; and POWERPLANT written, oral and practical. The only way a person can get authorization to take these examinations is to (1) graduate from an approved school or (2) obtain permission from the FAA to take the test based on prior experience on certified aircraft. Schools cannot grant permission (FAA FAR, Part 65 and Part 147, Subpart C 147.31).

Since an Aviation Maintenance Technician School (AMTS) is certified and inspected by the FAA, satisfaction of FAR Part 147 requirements should be the primary concern of an AMTS. When local and state educational requirements conflict with the FAA's regulation of an AMTS, those requirements must be resolved to satisfy FAR Part 147. In other words, FAA standards take precedence over other requirements. The FAA specifies minimum hours required and encourages schools to exceed minimum standards for the curriculum. The course content specified by the FAA may not be lowered.

"FAA FAR Part 147" identifies standards required by the FAA. Minimum teaching levels expected by the FAA also appear:

**Level 1:** knowledge of general principles

**Level 2:** knowledge of general principles and limited practical application

**Level 3:** knowledge of general principles with a high degree of practical application and hands-on skill levels according to FAA FAR Part 147:

For subjects taught at Level 3, all special tools required to meet "return to service" standards must be in satisfactory working condition, properly calibrated/tested, and of the proper kind for the purpose for which they are intended. Tools should include an adequate supply of special tools appropriate to the ratings and curriculum. If students are required to provide hand tools, then the school should list the specific tools with the curriculum and provide a copy of this list to the students. Shop equipment and special tools should be maintained in good working order



and be in a condition for safe operation. All tools and equipment should be maintained in good working order and be in a condition for safe operation. The types of tools and equipment required for Aviation General, Airframe, and Powerplant teaching include the ones listed below: Common hand tools, portable tools, precision tools, machine tools, torsion tools, shop equipment and machinery, specialized tools and equipment, airframe structures, aircraft, airframes, powerplants, propellers, and components of this equipment.

**FAA FAR Part 147 states:** Each certified Aviation Maintenance Technician School shall provide facilities, equipment, and material equal to the standards currently required for the issue of the certificate and rating that it holds.

**Refer to FAA FAR Part 147 and industry publications** for more information about required levels of proficiency, hours of instruction, and updates to occupational titles and training requirements. Keeping pace with the standards of industry and maintaining a high quality of training requires ongoing linkages with industry and FAA representatives.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 83 credit hours according to Rule 6A-14.030, F.A.C.

### **Standards**

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

01.0 Perform basic electricity skills.

- 02.0 Perform basic aircraft drawing skills.
- 03.0 Demonstrate aircraft weight and balance skills.
- 04.0 Maintain aircraft fluid lines and fittings.
- 05.0 Perform aircraft materials and process skills.
- 06.0 Perform ground operations and servicing duties.
- 07.0 Perform cleaning and corrosion control operations.
- 08.0 Demonstrate mathematics skills.
- 09.0 Maintain forms and records.
- 10.0 Apply basic physics to airframe and powerplant systems.
- 11.0 Demonstrate the use of maintenance publications.
- 12.0 Interpret mechanic privileges.
- 13.0 Perform basic reciprocating engine skills.
- 14.0 Perform basic turbine engine skills.
- 15.0 Perform engine inspection.
- 16.0 Maintain engine instrument systems.
- 17.0 Maintain engine fire protection systems.
- 18.0 Maintain engine electrical systems.
- 19.0 Maintain lubrication systems.
- 20.0 Maintain ignition systems.
- 21.0 Maintain fuel metering systems.
- 22.0 Maintain engine fuel systems.
- 23.0 Maintain injection systems.
- 24.0 Maintain engine cooling systems.
- 25.0 Maintain engine exhaust systems.
- 26.0 Maintain aircraft propellers.
- 27.0 Maintain wood structures.
- 28.0 Perform aircraft covering.
- 29.0 Apply aircraft finishes.
- 30.0 Repair sheetmetal structures.
- 31.0 Perform aircraft welding.
- 32.0 Perform airframe assembly and rigging.
- 33.0 Perform airframe inspection.
- 34.0 Maintain aircraft landing gear systems.
- 35.0 Maintain hydraulic and pneumatic power systems.
- 36.0 Maintain cabin atmosphere control systems.
- 37.0 Maintain aircraft instrument systems.
- 38.0 Maintain communication and navigation systems.
- 39.0 Inspect and repair aircraft fuel systems.
- 40.0 Inspect or repair aircraft electrical systems.
- 41.0 Inspect and repair position and warning systems.
- 42.0 Maintain ice and rain control systems.
- 43.0 Inspect and repair aircraft fire protection systems.
- 44.0 Demonstrate knowledge of FAA aircraft mechanic licensing requirements.
- 45.0 Demonstrate the human relations skills necessary for success in supervision.
- 46.0 Demonstrate knowledge of skills and attitudes the supervisor needs for effective performance.
- 47.0 Demonstrate a practical approach to job management.
- 48.0 Demonstrate appropriate communication skills.
- 49.0 Demonstrate appropriate math skills.
- 50.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Aviation Maintenance Management  
**CIP Numbers:** 1649010401 AS, 0649010401 AAS  
**Program Length:** 83 credit hours  
**SOC Code(s):** 49-3011

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

01.0 Perform basic electricity skills--The student will be able to:

- 01.01 Measure capacitance and inductance.
- 01.02 Calculate and measure electrical power.
- 01.03 Measure voltage, current, resistance, continuity, and leakage.
- 01.04 Determine the relationship of voltage, current, and resistance in electrical circuits.
- 01.05 Read and interpret electrical circuit diagrams.
- 01.06 Inspect and service batteries.
- 01.07 Utilize proper electrical safety procedures.
- 01.08 Troubleshoot electrical systems.

02.0 Perform basic aircraft drawing skills--The student will be able to:

- 02.01 Use drawings, symbols, and schematic diagrams.
- 02.02 Draw sketches of repairs and alterations.
- 02.03 Use blueprint information.
- 02.04 Use graphs and charts.

03.0 Demonstrate aircraft weight and balance skills--The student will be able to:

- 03.01 Weigh aircraft.
- 03.02 Perform complete weight and balance check and record data.
- 03.03 Utilize proper personal safety procedures.

04.0 Maintain aircraft fluid lines and fittings--The student will be able to:

- 04.01 Fabricate and install rigid and flexible fluid lines and fittings.
- 04.02 Identify and utilize special fluid line tools.

05.0 Perform aircraft materials and processes skills--The student will be able to:

- 05.01 Identify and select appropriate hand and power tools.
- 05.02 Identify and select appropriate nondestructive testing methods.
- 05.03 Perform penetrant, chemical etching, and magnetic particle inspections.
- 05.04 Perform basic heat-treating processes.
- 05.05 Identify and select aircraft hardware.
- 05.06 Inspect and check welds.

- 05.07 Perform precision measurements.
- 05.08 Perform safety wiring techniques.
  
- 06.0 Perform ground operations and servicing duties--The student will be able to:
  - 06.01 Start, ground operate, move, service, and secure aircraft.
  - 06.02 Identify and select fuels.
  - 06.03 Comply with prescribed shop and personal safety procedures.
  
- 07.0 Perform cleaning and corrosion control operations--The student will be able to:
  - 07.01 Identify and select cleaning materials.
  - 07.02 Perform aircraft cleaning and corrosion control.
  - 07.03 Identify and utilize appropriate equipment for cleaning and corrosion control.
  - 07.04 Observe appropriate personal safety procedures for corrosive chemicals.
  
- 08.0 Demonstrate mathematical skills--The student will be able to:
  - 08.01 Work with the common sets of real numbers in performing the four basic operations.
  - 08.02 Use the four basic operations in working with polynomial expressions.
  - 08.03 Solve linear equations in one variable and applied problems.
  - 08.04 Solve linear inequalities in one variable and applied problems.
  - 08.05 Factor polynomials.
  - 08.06 Simplify algebraic fractions, complex fractions and solve rational and literal equations and applied problems.
  - 08.07 Extract roots and raise numbers to a given power.
  - 08.08 Determine areas and volumes of various geometrical shapes.
  - 08.09 Solve ratio, proportion, and percentage problems.
  - 08.10 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers.
  - 08.11 Graph linear equations and inequalities in two variables and solve graph systems of linear equations and inequalities in two variables.
  - 08.12 Solve and graph quadratic equations and inequalities with real solutions and solve related word problems.
  - 08.13 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 08.14 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 08.15 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 08.16 Determine the correct purchase price, to include sales tax, for a materials list containing a minimum of six items.
  - 08.17 Demonstrate an understanding of federal, state and local taxes and their computation.
  
- 09.0 Maintain forms and records--The student will be able to:
  - 09.01 Write descriptions of aircraft condition and work performed.
  - 09.02 Complete required maintenance forms, records, and inspection reports.
  
- 10.0 Apply basic physics to airframe and powerplant systems--The student will be able to:

- 10.01 Use the principles of simple machines; also of sound, fluid, and heat dynamics.
  - 10.02 Explain the effect of air density on engine power output and airfoil lift.
  - 10.03 Understand molecular action as a result of temperature extremes, chemical reactions, and moisture content.
  - 10.04 Draw conclusions or make inferences from data.
  - 10.05 Identify health-related problems which may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 10.06 Understand pressure measurement in terms of P.S.I., inches of mercury and K.P.A.
- 11.0 Demonstrate the use of maintenance publications--The student will be able to:
- 11.01 Select and use FAA and manufacturer's aircraft maintenance specifications and related regulations.
  - 11.02 Read technical data.
  - 11.03 Retrieve data from maintenance data banks.
  - 11.04 Identify suspected unapproved parts in accordance with FAA procedures.
- 12.0 Interpret mechanic privileges--The student will be able to:
- 12.01 Exercise mechanic privileges within the limitations prescribed by FAR Part 65.
  - 12.02 Comply with prescribed shop and personal safety procedures.
- 13.0 Perform basic reciprocating engine skills--The student will be able to:
- 13.01 Inspect and repair 14-cylinder or larger radial engine.
  - 13.02 Overhaul reciprocating engine.
  - 13.03 Inspect, check, service, and repair opposed and radial engine and reciprocating engine installations.
  - 13.04 Install, troubleshoot, and remove reciprocating engine.
- 14.0 Perform basic turbine engine skills--The student will be able to:
- 14.01 Overhaul turbine engine.
  - 14.02 Inspect, check, service, and repair turbine engines and turbine engine installations.
  - 14.03 Install, troubleshoot, and remove turbine engines.
- 15.0 Perform engine inspection--The student will be able to:
- 15.01 Perform powerplant conformity and air worthiness inspections.
  - 15.02 Perform appropriate safety wiring checks.
- 16.0 Maintain engine instrument systems--The student will be able to:
- 16.01 Troubleshoot, service, and repair fluid rate-of-flow indicating systems.
  - 16.02 Inspect, check, service, troubleshoot, and repair engine temperature, pressure, and rpm indicating systems.

- 17.0 Maintain engine fire protection systems--The student will be able to:
  - 17.01 Inspect, check, service, troubleshoot, and repair engine fire detection and extinguishing systems.
  - 17.02 Perform appropriate safety wiring check and repairs.
  
- 18.0 Maintain engine electrical systems--The student will be able to:
  - 18.01 Repair engine electrical system components.
  - 18.02 Install, check and service engine electrical wiring, controls, switches, indicators, and protective devices.
  - 18.03 Identify and utilize special electrical tools and equipment
  
- 19.0 Maintain lubrication systems--The student will be able to:
  - 19.01 Identify and select lubricants.
  - 19.02 Repair engine lubrication system components.
  - 19.03 Inspect, check, service, troubleshoot, and repair engine lubrication system.
  
- 20.0 Maintain ignition systems--The student will be able to:
  - 20.01 Overhaul magneto and ignition harness.
  - 20.02 Repair engine ignition system components.
  - 20.03 Inspect, check, service, troubleshoot, and repair reciprocating and turbine engine ignition systems.
  
- 21.0 Maintain fuel metering systems--The student will be able to:
  - 21.01 Inspect, check, and service water injection systems.
  - 21.02 Overhaul carburetor.
  - 21.03 Repair engine fuel metering system components.
  - 21.04 Inspect, check, troubleshoot, and repair reciprocating and turbine engine fuel metering systems.
  - 21.05 Perform safety wiring techniques.
  
- 22.0 Maintain engine fuel systems--The student will be able to:
  - 22.01 Repair engine fuel system components.
  - 22.02 Inspect, check, service, troubleshoot, and repair engine fuel systems.
  - 22.03 Inspect, check, service, and repair carburetor air intake and induction manifolds.
  
- 23.0 Maintain injection systems--The student will be able to:
  - 23.01 Inspect, repair, and maintain fuel injection systems
  
- 24.0 Maintain engine cooling systems--The student will be able to:
  - 24.01 Repair engine cooling system components.
  - 24.02 Inspect, check, troubleshoot, service and repair engine cooling systems.
  
- 25.0 Maintain engine exhaust systems--The student will be able to:

- 25.01 Repair engine exhaust system components.
- 25.02 Inspect, check, troubleshoot, service and repair engine exhaust systems.
- 26.0 Maintain aircraft propellers--The student will be able to:
  - 26.01 Inspect, check, service and repair propeller synchronizing and ice control systems.
  - 26.02 Identify and select propeller lubricants.
  - 26.03 Balance propellers.
  - 26.04 Repair propeller control system components.
  - 26.05 Inspect and repair fixed-pitch, constant speed and feathering propellers and governing system.
  - 26.06 Install, troubleshoot and remove propellers.
- 27.0 Maintain wood structures--The student will be able to:
  - 27.01 Service and repair wood structures.
  - 27.02 Identify wood defects.
  - 27.03 Inspect wood structures.
- 28.0 Perform aircraft covering--The student will be able to:
  - 28.01 Select and apply fabric and fiberglass covering materials.
  - 28.02 Inspect, test and repair fabric and fiberglass.
- 29.0 Apply aircraft finishes--The student will be able to:
  - 29.01 Apply trim, letters and touch-up paint.
  - 29.02 Identify and select aircraft finishing materials.
  - 29.03 Apply paint and dope.
  - 29.04 Inspect finishes and identify defects.
  - 29.05 Adhere to all safety practices dealing with flammable materials.
- 30.0 Repair sheet metal structures--The student will be able to:
  - 30.01 Identify and utilize appropriate metalworking tools and equipment.
  - 30.02 Install special rivets and fasteners.
  - 30.03 Inspect bonded structures.
  - 30.04 Inspect and repair plastics, honeycomb and laminated structures.
  - 30.05 Inspect, check, service and repair windows, doors and interior furnishings.
  - 30.06 Inspect and repair sheet-metal structures.
  - 30.07 Install conventional rivets.
  - 30.08 Hand form, lay out and bend sheet metal.
- 31.0 Perform aircraft welding--The student will be able to:
  - 31.01 Identify and utilize appropriate welding equipment and material.
  - 31.02 Solder stainless steel.
  - 31.03 Fabricate tubular structures.
  - 31.04 Solder, braze, gas-weld and arc-weld steel.

- 31.05 Weld aluminum and stainless steel.
- 31.06 Weld magnesium and titanium.
  
- 32.0 Perform airframe assembly and rigging--The student will be able to:
  - 32.01 Identify and utilize appropriate rigging tools and equipment.
  - 32.02 Rig rotary-wing aircraft.
  - 32.03 Rig fixed-wing aircraft.
  - 32.04 Check alignment of structures.
  - 32.05 Assemble aircraft.
  - 32.06 Balance and rig movable structures.
  - 32.07 Jack aircraft.
  
- 33.0 Perform airframe inspection--The student will be able to:
  - 33.01 Perform conformity and airworthiness inspections.
  - 33.02 Properly complete compliance forms and records.
  
- 34.0 Maintain aircraft landing gear systems--The student will be able to:
  - 34.01 Inspect, check, service and repair landing gear retraction systems.
  - 34.02 Inspect, check, service and repair shock struts, brakes, wheels, tires and steering system.
  
- 35.0 Maintain hydraulic and pneumatic power systems--The student will be able to:
  - 35.01 Repair hydraulic and pneumatic power system components.
  - 35.02 Identify and repair hydraulic fluids.
  - 35.03 Inspect and repair hydraulic and pneumatic power systems.
  - 35.04 Identify and utilize appropriate hydraulic and pneumatic tools and equipment.
  
- 36.0 Maintain cabin atmosphere control systems--The student will be able to:
  - 36.01 Repair air conditioning, pressurization and oxygen system components.
  - 36.02 Inspect and repair heating, air conditioning and pressurization systems.
  - 36.03 Inspect, check, troubleshoot, service and repair oxygen systems.
  
- 37.0 Maintain aircraft instrument systems--The student will be able to:
  - 37.01 Remove and install electrical, mechanical and pneumatic instruments.
  - 37.02 Inspect and repair heading, speed, altitude, attitude and position systems.
  
- 38.0 Maintain communication and navigation systems--The student will be able to:
  - 38.01 Inspect, check and service auto-pilot and approach control systems.
  - 38.02 Inspect, check and service electronic communication and navigation systems.
  - 38.03 Inspect and repair antenna and electronic equipment installations.
  - 38.04 Identify and utilize special electronic tools and equipment.
  - 38.05 Inspect and repair data buses and associated systems, including fiber optic systems.



- 39.0 Inspect and repair aircraft fuel systems--The student will be able to:
  - 39.01 Check and service fuel dump systems.
  - 39.02 Perform fuel management, transfer and defueling.
  - 39.03 Inspect, check and repair pressure fuel systems.
  - 39.04 Repair aircraft fuel system components.
  - 39.05 Inspect and repair fluid quantity indicating systems.
  - 39.06 Troubleshoot, service and repair fluid and temperature warning systems.
  - 39.07 Inspect, check, service, troubleshoot and repair aircraft fuel systems.
  
- 40.0 Inspect and repair aircraft electrical systems--The student will be able to:
  - 40.01 Identify and utilize appropriate electrical tools and equipment.
  - 40.02 Repair aircraft electrical system components.
  - 40.03 Remove, service and install electric indicators, protective devices, wiring and controls.
  - 40.04 Inspect and repair AC and DC current electrical systems.
  
- 41.0 Inspect and repair position and warning systems--The student will be able to:
  - 41.01 Inspect, check and service speed and takeoff-warning systems, electrical brake controls and antiskid systems.
  - 41.02 Inspect and repair landing gear and position-indicating warning systems.
  
- 42.0 Maintain ice and rain control systems--The student will be able to:
  - 42.01 Inspect, service and repair airframe ice and rain control systems.
  - 42.02 Demonstrate operation of airframe ice and rain control systems.
  
- 43.0 Inspect and repair aircraft fire protection systems--The student will be able to:
  - 43.01 Inspect, check and service smoke and carbon monoxide detection systems.
  - 43.02 Inspect and repair fire detection and fire extinguishing systems.
  
- 44.0 Demonstrate knowledge of FAA aircraft mechanic licensing requirements--The student will be able to:
  - 44.01 Successfully complete the FAA powerplant written, oral and practical examinations.
  - 44.02 Display an FAA powerplant Mechanic's certificate.
  - 44.03 Successfully complete the FAA airframe written, oral and practical examinations.
  - 44.04 Display an FAA airframe mechanic's certificate.
  
- 45.0 Demonstrate the human relations skills necessary for success in supervision--The student will be able to:
  - 45.01 Exhibit the ability to get along with others.
  - 45.02 Discuss the importance of human relations.
  - 45.03 Develop and demonstrate the unique human relations skills needed for successful entry and progress in supervising others.

- 46.0 Demonstrate knowledge of skills and attitudes the supervisor needs for effective performance--The student will be able to:
- 46.01 Describe leadership theory and its complexity.
  - 46.02 Discuss how a new supervisor is introduced to leadership responsibilities.
  - 46.03 Identify the legal and social environment for supervision.
  - 46.04 Discuss pertinent legislation and the role of government intervention.
  - 46.05 Describe problems in union and non-union organizations.
- 47.0 Demonstrate a practical approach to job management--The student will be able to:
- 47.01 Assume responsibility in planning and coordinating resources.
  - 47.02 Demonstrate effective decision making and problem-solving techniques.
  - 47.03 Implement methods of work improvement.
- 48.0 Demonstrate appropriate communication skills--The student will be able to:
- 48.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 48.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 48.03 Read and follow written and oral instructions.
  - 48.04 Answer and ask questions coherently and concisely.
  - 48.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 48.06 Demonstrate appropriate telephone/communication skills.
  - 48.07 Describe the importance of clear and concise writing.
  - 48.08 Demonstrate proficiency in the effective use of speech and vocabulary.
  - 48.09 Explain the importance of good listening skills.
  - 48.10 Discuss the role communication plays in management.
  - 48.11 Demonstrate the components of the communication process.
  - 48.12 Demonstrate effective written communication skills.
  - 48.13 Demonstrate effective oral communication skills.
  - 48.14 Write technical reports.
- 49.0 Demonstrate employability skills--The student will be able to:
- 49.01 Conduct a job search.
  - 49.02 Secure information about a job.
  - 49.03 Identify documents which may be required when applying for a job interview.
  - 49.04 Complete a job application form correctly.
  - 49.05 Demonstrate competence in job interview techniques.
  - 49.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 49.07 Identify acceptable work habits.
  - 49.08 Demonstrate knowledge of how to make appropriate job changes.
  - 49.09 Demonstrate acceptable employee health and grooming habits.
  - 49.10 Exhibit punctuality, initiative, courtesy, loyalty and honesty.
  - 49.11 Demonstrate knowledge of the "Right-To-Know Law" as recorded in 29 CFR-1910, 1200.

50.0 Demonstrate an understanding of computer skills--The student will be able to:

- 50.01 Demonstrate use of spreadsheets, databases and word processing.
- 50.02 Demonstrate use of Internet including locating information, copying and printing web-based information.
- 50.03 Demonstrate general knowledge of computer components.
- 50.04 Demonstrate the location and use of anti virus capability.
- 50.05 Demonstrate the ability to communicate by e-mail.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Aviation Administration  
**Career Cluster:** Transportation, Distribution and Logistics

	AS	AAS
CIP Number	1649010402	0649010402
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	53-2022	53-2022
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fl DOE.org/workforce/perkins/perkins_resources.asp">http://www.fl DOE.org/workforce/perkins/perkins_resources.asp</a>	

### 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 purpose of this program is to prepare students who are seeking employment in the aviation/airline/airport fields. Some of the students will be able to obtain opportunities in the federal, state and local government aviation fields, while others will find opportunities in airline fields, such as initial entry level jobs in customer service and operations and air cargo as well as lower to middle level management positions. Others will find positions in supporting aviation entities, such as suppliers and service providers to airlines and government aviation agencies.

Airport facility equipment,/ground equipment; aircraft operating requirements/limitations, navigational equipment, aviation weather reports and conditions, air traffic control equipment/procedures; customer service information technology tools and air cargo ground handling equipment and procedures.

The content includes but is not limited to, communication skills, leadership skills, directing, planning and controlling, human relations and employability skills, safe and efficient work practices, technical skills such as aircraft and ground equipment operations and terminology,

records management, security issues, Federal Aviation Regulations, and air cargo processes and practices.

## **Program Structure**

This program is a planned sequence of instruction consisting of 64 credit hours.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

No PSAV programs articulate credit into this degree program.

No industry certifications articulate credit into this degree program.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS/AAS degree program includes the following College Credit Certificates:

- Airline/Aviation Management (0649010403) – 16 credit hours
- Air Cargo Management (0649010404) – 16 credit hours
- Airport Management (0649010405) – 16 credit hours
- Passenger Agent (0649010406) – 16 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

### **Standards**

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

- 01.0 Demonstrate an understanding of basic aviation terminology and history.
- 02.0 Demonstrate appropriate math skills.
- 03.0 Demonstrate appropriate communications/English skills.
- 04.0 Demonstrate an understanding of aviation operations practices, limitations and procedures.
- 05.0 Demonstrate an understanding of federal, state and other governmental laws, rules and policies as they relate to aviation.
- 06.0 Demonstrate an understanding of airline and airport management practices, including leadership, communications, directing, planning and controlling.
- 07.0 Demonstrate an understanding of aviation security issues and responses.
- 08.0 Demonstrate an understanding of aviation/airline marketing, customer service/sales distribution/and reservations/ticketing.
- 09.0 Demonstrate an understanding of aero meteorology and basic science/aerodynamics knowledge.
- 10.0 Demonstrate an understanding of aviation safety and human factors, including accident prevention.
- 11.0 Demonstrate an understanding of air traffic control procedures and policies.
- 12.0 Demonstrate an understanding of air cargo operations and procedures.
- 13.0 Demonstrate employability skills.
- 14.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Aviation Administration  
**CIP Numbers:** 1649010402 A.S./ 0649010402 A.A.S.  
**Program Length:** 64 credit hours  
**SOC Code(s):** 53-2022

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of basic aviation terminology and history--The student will be able to:
- 01.01 Explain the overall scope and breadth of the aviation industry including its impact on the economy.
  - 01.02 Distinguish the terms and vocabularies that are used in the Aerospace and Commercial Aviation Industry.
  - 01.03 Describe the history of technological, governmental, social and economic developments of aviation.
  - 01.04 Explain the different types and categories of aircraft in use in the industry by distinguishing and identifying: Various wide body, narrow body types and general aviation aircraft.
  - 01.05 Demonstrate an understanding of the oversight role of the Federal Government and its effect on the aviation industry.
- 02.0 Demonstrate appropriate math skills--The student will be able to:
- 02.01 Solve problems for volume, weight, area circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 02.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 02.03 Add, subtract, multiply and divide using fractions, decimals and whole numbers.
  - 02.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 02.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 03.0 Demonstrate appropriate communication/English skills--The student will be able to:
- 03.01 Write logical and understandable statements, or phrases, to complete with accuracy the forms/invoices commonly used in business and industry.
  - 03.02 Read and understand graphs, charts, diagrams and tables commonly used in this industry/occupational area.
  - 03.03 Read and follow written and oral instructions.
  - 03.04 Answer and ask questions coherently and concisely.
  - 03.05 Read critically by recognizing assumptions and implications and by evaluating ideas.

- 03.06 Demonstrate appropriate telephone/communications skills.
- 04.0 Demonstrate an understanding of aviation operations practices, limitations and procedures--The student will be able to:
- 04.01 Demonstrate knowledge of aircraft systems as they apply to flight operations, including engines, fuel, electrical, hydraulics, pneumatics, flight controls and avionics.
  - 04.02 Understand the various factors of aircraft performance, including takeoff, enroute and landing limitations and weight and balance.
  - 04.03 Demonstrate knowledge of the function of flight operations, including pilot hiring, training, standards, safety issues, security issues, FAA and TSA regulations, documentation requirements, operations specifications, and crew scheduling as well as flight attendant and dispatcher requirements.
  - 04.04 Describe how airline maintenance operates and its role and effect on flight operations, with both scheduled and non-scheduled maintenance.
  - 04.05 Demonstrate an understanding of the role of the flight operations professional in the economic and planning functions of an airline.
  - 04.06 Explain FAA requirements such as flight standards, types of certificates, training and record keeping surveillance and investigations as well as the operator's response and its relationship with the FAA.
  - 04.07 Describe the role of the National Transportation Safety Board in accident investigation as well as NASA's role in aviation safety reporting systems and research.
  - 04.08 Demonstrate knowledge of the application of information technology systems in flight operations as they relate to flight planning systems, flight management systems, satellite communication and navigation systems, weight and balance, cockpit displays and automation, maintenance monitoring and management information systems.
- 05.0 Demonstrate an understanding of federal, state and other governmental laws, rules and policies as they relate to aviation--The student will be able to:
- 05.01 Demonstrate knowledge of the history and foundations of the legal system in the United States and the historical development of aviation law.
  - 05.02 Describe the state and federal system of trial, appellate and supreme courts as well as subject matter jurisdiction.
  - 05.03 Distinguish the role and function of the US Department of Transportation, Federal Aviation Administration, Transport Security Administration and the National Transportation Safety Board as it relates to their legal responsibilities and the federal statutes that give them their authority as well as the process of creating and enforcing applicable regulations.
  - 05.04 Demonstrate a knowledge of airman rights and responsibilities, including negligence, FAA enforcement, immunity, and degrees of care.
  - 05.05 Explain state aviation law, relating to airports, fixed based operators, aircraft sales, registration and taxation issues.
  - 05.06 Understand the legal issues relating to the aircraft manufacturing and the airline industry, including warranties, products liability, negligence, accident litigation, consumer issues and labor issues.
  - 05.07 06.07 Demonstrate knowledge of international air law, including the Warsaw Convention, the Chicago Convention, bilateral and multilateral agreements, the



International Civil Aviation Organization, and the International Air Transport Association as well as issues of international jurisdiction, limits of liability and damages.

- 05.08 Understand the legal issues that relate to aviation security issues, including hijacking and bomb threats.
  
- 06.0 Demonstrate an understanding of airline and airport management practices, including leadership, communications, directing, planning and controlling--The student will be able to:
  - 06.01 Understand the historical aspects of the science of management as it has developed in the U.S. including how the changing economy and technology affected the development of management techniques.
  - 06.02 Describe the various environments that airline and airport management have to deal with in evaluating what factors will affect their organization, such as changes in competition, economics, social factors, government policies and technology.
  - 06.03 Describe the various philosophies of organizational design and how this applies to the airlines and airports. This will include: Pyramidal structures, matrix structures and amorphic project type structures.
  - 06.04 Demonstrate an understanding of the various functional areas of an airline. This will include: Flight Operations, Maintenance, Customer Service and Marketing, Planning and Finance.
  - 06.05 Demonstrate an understanding of the various functions of an airport, including airside and landside operations and management, and financial planning, including airport master plans, environmental issues and land use.
  - 06.06 Describe the factors of effective communication in an airline/airport environment, such as: Effective listening, minimizing levels of communication, using technology properly, and both formal and informal communication methods.
  - 06.07 Describe the various methods of motivation for employees in an airline/airport environment, such as: Reward systems, negative incentives, empowerment and teams versus individual performance.
  - 06.08 Demonstrate an understanding of labor relations in an airline/airport environment including the framework of applicable law, how a contract negotiation works and how a grievance process works.
  - 06.09 Describe the effect of various leadership styles that are used in the airline/airport environment, including, an authoritative style, a participative style and a laissez-faire style.
  - 06.10 Demonstrate an understanding of the various control processes used in the airline/airport industry, such as: Budgets and audits, physical performance, such as on-time performance and customer complaints and quality issues.
  - 06.11 Describe the processes involved with strategic planning and how it is used in the airline/airport industry. This includes: Forecasting of demand, deciding levels of operations, and developing an operational schedule.
  
- 07.0 Demonstrate an understanding of aviation security issues and responses--The student will be able to:
  - 07.01 Describe the types of threats that can be encountered in civil aviation including bomb threats, and actual bombs, hijackings/air piracy, aggressive/disruptive passengers, and crew and security problems.

- 07.02 Discuss the law of aviation security, such the Aviation Safety and Security Act of 2001, and FAR Parts 108 and 109.
  - 07.03 Describe the components of a layered aviation security system.
  - 07.04 Demonstrate an understanding of the need for planning for all possible security threats, and having contingency plans and responsive measures.
  - 07.05 Explain the specific factors of ground security threats, including restricted access, inspections of personnel baggage and goods.
  - 07.06 Discuss possible airborne threats and procedures to deal with those, such as maintaining flight deck integrity and Air Marshals.
  - 07.07 Demonstrate an understanding of the technologies that are used in aviation security, as well as effective screening techniques.
  - 07.08 Explain personnel selection, training and methods for maintaining appropriate job performance for security personnel.
- 08.0 Demonstrate an understanding of aviation/airline marketing, customer service/sales distribution and reservations and ticketing--The student will be able to:
- 08.01 Explain the Marketing Concept and how it differs from the Product and sales Concepts.
  - 08.02 Analyze the various environmental factors that affect aviation/airline marketing.
  - 08.03 Demonstrate an understanding of market demographics and segmentation.
  - 08.04 Explain the methods of market research.
  - 08.05 Analyze why a customer buys a particular product or service.
  - 08.06 Explain the different media that are available for airline industry advertising and promotion, and the advantages and disadvantages of each.
  - 08.07 Describe pricing strategies that are used by the airlines.
  - 08.08 Describe the factors of success in customer service.
  - 08.09 Explain how to deliver quality customer service.
  - 08.10 Demonstrate an understanding of why companies lose customers and how to recover a customer from a bad experience.
  - 08.11 Explain the principles of reservations, including passenger name records, flight schedules, availability and fares.
  - 08.12 Discuss the procedure of airline ticketing, including fares, one way, round trip, change rules, refunds, taxes charges and interline agreements.
  - 08.13 Explain the process of internet reservations, e-ticketing and travel agency functions.
- 09.0 Demonstrate an understanding of aero meteorology and basic science /aerodynamic knowledge--The student will be able to:
- 09.01 Discuss the makeup of the earth's atmosphere and the effect of the sun on the atmosphere.
  - 09.02 Describe the movement of air masses and how fronts are created.
  - 09.03 Explain how seasons affect weather patterns in various geographic areas.
  - 09.04 Describe the effect of the earth's rotation on weather.
  - 09.05 Discuss the effect of local geography on weather, such as bodies of water and mountains.
  - 09.06 Explain the hazards to flight, including thunderstorms, icing, turbulence, and fog.
  - 09.07 Describe the characteristics of high altitude weather, including jet streams and clear air turbulence, pressure and temperature patterns.

- 09.08 List the products, reports and forecasts of the National Weather Service as they pertain to Aviation.
  - 09.09 Describe the basic rules of aerodynamics, including lift, gravity, thrust and drag.
  - 09.10 Explain how an aircraft performs in the different regimes of flight, including climb, cruise, turns and descent.
  - 09.11 Describe the effects of various inputs of each flight control and their effect, including rudder, elevators, ailerons, flaps and spoilers.
  - 09.12 Explain the aerodynamic limits of an aircraft such as stall speeds, maximum speed limits, maneuvering speeds and altitude limits.
  - 09.13 Describe the different aspects of both stability and controllability of an aircraft.
  - 09.14 Discuss the characteristics of swept-wing high-speed aircraft, such as Dutch Roll, mach trim, center of lift and buffet limits.
  - 09.15 Explain how to obtain the maximum performance out of a particular aircraft in a particular condition.
- 10.0 Demonstrate an understanding of aviation safety and human factors, including accident prevention--The student will be able to:
- 10.01 Describe the nature of human factors and sources of errors.
  - 10.02 Discuss the issues of fatigue, body rhythms and sleep.
  - 10.03 Describe the effects of fitness and health on human performance.
  - 10.04 Discuss how motivation and leadership affects safety in aviation.
  - 10.05 Discuss the role of training devices and education in reducing errors and increasing safety.
  - 10.06 Describe how the physical layout of displays and controls and space relate to human factors errors.
  - 10.07 Explain how documentation problems such as manuals and checklists, maps and charts can cause safety issues.
  - 10.08 Describe how an aviation safety program is designed to create an environment of safety awareness and accident prevention.
- 11.0 Demonstrate an understanding of air traffic control procedures and policies--The student will be able to:
- 11.01 Discuss the basic terminology and communications phraseology that is used in air traffic control.
  - 11.02 Describe airspace classifications that are used in air traffic control.
  - 11.03 Discuss separation of aircraft requirements.
  - 11.04 Demonstrate an understanding of the Federal Aviation Regulations that apply to air traffic control.
  - 11.05 Explain aircraft characteristics and recognition.
  - 11.06 Describe instrument procedures, for departure, arrival and for IFR flight plans.
  - 11.07 Discuss the weather hazards to aircraft, including wake turbulence, downbursts and restrictions to visibility.
  - 11.08 Review ATC Clearances, including their purpose and the different types of ATC clearances, the appropriate sequence and pilot responsibilities for compliance.
  - 11.09 Describe the fundamentals of radar, including information about primary and secondary radar systems.
  - 11.10 Explain strip marking (radar and non-radar), including the basic outline for strip marking and the associated symbologies for En Route, Terminal, and Flight Service Options.

- 11.11 Explain non-radar procedures, including horizontal and vertical separation, timed approaches.
- 12.0 Demonstrate an understanding of air cargo operations and procedures--The student will be able to:
  - 12.01 Describe the importance of air cargo to the economy.
  - 12.02 Discuss the different types of customers and how marketing is done in the air cargo industry.
  - 12.03 Explain the role of freight forwarders and customs brokers.
  - 12.04 Explain the different classes of cargo, such as general, high value and perishable, including live animals.
  - 12.05 Demonstrate an understanding of the documentation requirements for air cargo, such as airway bills, insurance and customs documents.
  - 12.06 Describe the packing requirements for air cargo.
  - 12.07 Discuss the variety of ways that cargo is loaded on aircraft, including pallets and different sizes and types of containers and the loading equipment that is used.
  - 12.08 Explain the weight and balance restrictions that apply to air cargo aircraft.
  - 12.09 Describe the classification and identification of the nine classes of hazardous goods and their labeling and packaging requirements and shipping limitations and restrictions.
  - 12.10 Discuss what procedures to follow in the case of a dangerous goods accident or incident.
  - 12.11 Describe the security requirements for air cargo personnel, facilities and aircraft.
- 13.0 Demonstrate employability skills--The student will be able to:
  - 13.01 Conduct a job search.
  - 13.02 Secure information about a job.
  - 13.03 Identify documents which may be required when applying for a job interview.
  - 13.04 Complete a job application form correctly.
  - 13.05 Create an appropriate employer/job focused resume.
  - 13.06 Demonstrate competence in job interview techniques.
  - 13.07 Describe appropriate behavior on the job, including acceptable work and health habits.
  - 13.08 Discuss examples of employer discipline, reward and attendance programs as applied to employees.
- 14.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
  - 14.01 Define entrepreneurship.
  - 14.02 Describe the importance of entrepreneurship to the U.S. economy.
  - 14.03 List the advantages and disadvantages of business ownership.
  - 14.04 Identify the risks involved in ownership of a business.
  - 14.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 14.06 Identify the business skills needed to operate a small business efficiently and effectively.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Airline/Aviation Management  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0649010403
Program Type	College Credit Certificate (CCC)
Program Length	16 credit hours
CTSO	SkillsUSA
SOC Codes (all applicable)	53-2021
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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.

A part of the AS degree in Aviation Administration, the purpose of this certificate program is to prepare students who are seeking employment with a fast track in the aviation/airline fields. Some of the students will be able to obtain opportunities in the federal, state and local government aviation fields, while others will find opportunities in airline fields, such as initial entry level jobs in customer service and operations as well as lower to middle level management positions. Others will find positions in supporting aviation entities, such as suppliers and service providers to airlines and government aviation agencies. This program will benefit both students who do not have any other college experience, as well as those who have an associate or bachelor's degree in another area and would like to acquire the specific skills in this area.

The content includes but is not limited to, communication skills, leadership skills, directing, planning and controlling, human relations and employability skills, marketing, legal issues and Federal Aviation Regulations.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate an understanding of basic aviation terminology and history.
- 02.0 Demonstrate an understanding of aviation operations practices, limitations and procedures.
- 03.0 Demonstrate an understanding of federal, state and other governmental laws, rules and policies as they relate to aviation.
- 04.0 Demonstrate an understanding of airline management practices, including leadership, communications, directing, planning and controlling.
- 05.0 Demonstrate an understanding of aviation/airline marketing, customer service/sales distribution/and reservations/ticketing.
- 06.0 Demonstrate employability skills.
- 07.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Airline/Aviation Management  
**CIP Number:** 0649010403  
**Program Length:** 16 credit hours  
**SOC Code(s):** 53-2021

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402). At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of basic aviation terminology and history.--The student will be able to:
- 01.01 Explain the overall scope and breadth of the aviation industry including its impact on the economy.
  - 01.02 Distinguish the terms and vocabularies that are used in the Aerospace and Commercial Aviation Industry.
  - 01.03 Describe the history of technological, governmental, social and economic developments of aviation.
  - 01.04 Explain the different types and categories of aircraft in use in the industry by distinguishing and identifying: Various wide body, narrow body types and general aviation aircraft.
  - 01.05 Demonstrate an understanding of the oversight role of the Federal Government and its effect on the aviation industry.
- 02.0 Demonstrate an understanding of aviation operations practices, limitations and procedures. --The student will be able to:
- 02.01 Demonstrate knowledge of aircraft systems as they apply to flight operations, including engines, fuel, electrical, hydraulics, pneumatics, flight controls and avionics.
  - 02.02 Understand the various factors of aircraft performance, including takeoff, enroute and landing limitations and weight and balance.
  - 02.03 Demonstrate knowledge of the function of flight operations, including pilot hiring, training, standards, safety issues, security issues, FAA and TSA regulations, documentation requirements, operations specifications, and crew scheduling as well as flight attendant and dispatcher requirements.
  - 02.04 Describe how airline maintenance operates and its role and effect on flight operations, with both scheduled and non-scheduled maintenance.
  - 02.05 Demonstrate an understanding of the role of the flight operations professional in the economic and planning functions of an airline.
  - 02.06 Explain FAA requirements such as flight standards, types of certificates, training and record keeping surveillance and investigations as well as the operator's response and its relationship with the FAA.
  - 02.07 Describe the role of the National Transportation Safety Board in accident investigation as well as NASA's role in aviation safety reporting systems and research.
  - 02.08 Demonstrate knowledge of the application of information technology systems in flight operations as they relate to flight planning systems, flight management

systems, satellite communication and navigation systems, weight and balance, cockpit displays and automation, maintenance monitoring and management information systems.

03.0 Demonstrate an understanding of federal, state and other governmental laws, rules and policies as they relate to aviation.--The student will be able to:

- 03.01 Demonstrate knowledge of the history and foundations of the legal system in the United States and the historical development of aviation law.
- 03.02 Describe the state and federal system of trial, appellate and supreme courts as well as subject matter jurisdiction.
- 03.03 Distinguish the role and function of the US Department of Transportation, Federal Aviation Administration, Transport Security Administration and the National Transportation Safety Board as it relates to their legal responsibilities and the federal statutes that give them their authority as well as the process of creating and enforcing applicable regulations.
- 03.04 Demonstrate a knowledge of airman rights and responsibilities, including negligence, FAA enforcement, immunity, and degrees of care.
- 03.05 Explain state aviation law, relating to airports, fixed based operators, aircraft sales, registration and taxation issues.
- 03.06 Understand the legal issues relating to the aircraft manufacturing and the airline industry, including warranties, products liability, negligence, accident litigation, consumer issues and labor issues.
- 03.07 Demonstrate knowledge of international air law, including the Warsaw Convention, the Chicago Convention, bilateral and multilateral agreements, the International Civil Aviation Organization, and the International Air Transport Association as well as issues of international jurisdiction, limits of liability and damages.
- 03.08 Understand the legal issues that relate to aviation security issues, including hijacking and bomb threats.

04.0 Demonstrate an understanding of airline management practices, including leadership, communications, directing, planning and controlling.--The student will be able to:

- 04.01 Understand the historical aspects of the science of management as it has developed in the U.S. including how the changing economy and technology affected the development of management techniques.
- 04.02 Describe the various environments that airline management have to deal with in evaluating what factors will affect their organization, such as changes in competition, economics, social factors, government policies and technology.
- 04.03 Describe the various philosophies of organizational design and how this applies to the airlines. This will include: Pyramidal structures, matrix structures and amorphic project type structures.
- 04.04 Demonstrate an understanding of the various functional areas of an airline. This will include: Flight Operations, Maintenance, Customer Service and Marketing, Planning and Finance.
- 04.05 Describe the factors of effective communication in an airline environment, such as: Effective listening, minimizing levels of communication, using technology properly, and both formal and informal communication methods.



- 04.06 Describe the various methods of motivation for employees in an airline environment, such as: Reward systems, negative incentives, empowerment and teams versus individual performance.
  - 04.07 Demonstrate an understanding of labor relations in an airline environment including the framework of applicable law, how a contract negotiation works and how a grievance process works.
  - 04.08 Describe the effect of various leadership styles that are used in the airline environment, including, an authoritative style, a participative style and a laissez-faire style.
  - 04.09 Demonstrate an understanding of the various control processes used in the airline industry, such as: Budgets and audits, physical performance, such as on-time performance and customer complaints and quality issues.
  - 04.10 Describe the processes involved with strategic planning and how it is used in the airline industry. This includes: Forecasting of demand, deciding levels of operations, and developing an operational schedule.
- 05.0 Demonstrate an understanding of aviation/airline marketing, customer service/sales distribution and reservations and ticketing.--The student will be able to:
- 05.01 Explain the Marketing Concept and how it differs from the Product and sales Concepts.
  - 05.02 Analyze the various environmental factors that affect aviation/airline marketing.
  - 05.03 Demonstrate an understanding of market demographics and segmentation.
  - 05.04 Explain the methods of market research.
  - 05.05 Analyze why a customer buys a particular product or service.
  - 05.06 Explain the different media that are available for airline industry advertising and promotion, and the advantages and disadvantages of each.
  - 05.07 Describe pricing strategies that are used by the airlines.
  - 05.08 Describe the factors of success in customer service.
  - 05.09 Explain how to deliver quality customer service.
  - 05.10 Demonstrate an understanding of why companies lose customers and how to recover a customer from a bad experience.
  - 05.11 Explain the principles of reservations, including passenger name records, flight schedules, availability and fares.
  - 05.12 Discuss the procedure of airline ticketing, including fares, one way, round trip, change rules, refunds, taxes charges and interline agreements.
  - 05.13 Explain the process of internet reservations, e-ticketing and travel agency functions.
- 06.0 Demonstrate employability skills. --The student will be able to:
- 06.01 Conduct a job search.
  - 06.02 Secure information about a job.
  - 06.03 Identify documents which may be required when applying for a job interview.
  - 06.04 Complete a job application form correctly.
  - 06.05 Create an appropriate employer/job focused resume.
  - 06.06 Demonstrate competence in job interview techniques.
  - 06.07 Describe appropriate behavior on the job, including acceptable work and health habits.
  - 06.08 Discuss examples of employer discipline, reward and attendance programs as applied to employees.

07.0 Demonstrate an understanding of entrepreneurship.--The student will be able to:

07.01 Define entrepreneurship.

07.02 Describe the importance of entrepreneurship to the U.S. economy.

07.03 List the advantages and disadvantages of business ownership.

07.04 Identify the risks involved in ownership of a business.

07.05 Identify the necessary personal characteristics of a successful entrepreneur.

07.06 Identify the business skills needed to operate a small business efficiently and effectively.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Air Cargo Management  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0649010404
Program Type	College Credit Certificate (CCC)
Program Length	16 credit hours
CTSO	SkillsUSA
SOC Codes (all applicable)	53-1011
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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.

A part of the AS degree in Aviation Administration, the purpose of this program is to prepare students who are seeking employment in the aviation/airline/air cargo fields in a fast track. Some of the students will be able to obtain opportunities in airline fields, such as initial entry level jobs in air cargo and customer service as well as lower level management positions. Others will find positions in supporting aviation entities, such as suppliers and service providers to air cargo airlines and government aviation agencies.

The content includes but is not limited to, customer service, human relations and employability skills, safe and efficient work practices, technical skills such as air cargo documentation and terminology, records management, Federal Aviation Regulations, and air cargo processes and practices.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate an understanding of basic aviation terminology and history.
- 02.0 Demonstrate an understanding of aviation operations practices, limitations and procedures.
- 03.0 Demonstrate an understanding of effective customer service techniques.
- 04.0 Demonstrate an understanding of air cargo operations and procedures, emphasizing hazardous materials/dangerous goods.
- 05.0 Demonstrate employability skills.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Air Cargo Management  
**CIP Number:** 0649010404  
**Program Length:** 16 credit hours  
**SOC Code(s):** 53-1011

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402). At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of basic aviation terminology and history.--The student will be able to:
- 01.01 Explain the overall scope and breadth of the aviation industry including its impact on the economy.
  - 01.02 Distinguish the terms and vocabularies that are used in the Aerospace and Commercial Aviation Industry.
  - 01.03 Describe the history of technological, governmental, social and economic developments of aviation.
  - 01.04 Explain the different types and categories of aircraft in use in the industry by distinguishing and identifying: Various wide body, narrow body types and general aviation aircraft.
  - 01.05 Demonstrate an understanding of the oversight role of the Federal Government and its effect on the aviation industry.
- 02.0 Demonstrate an understanding of aviation operations practices, limitations and procedures. --The student will be able to:
- 02.01 Demonstrate knowledge of aircraft systems as they apply to flight operations, including engines, fuel, electrical, hydraulics, pneumatics, flight controls and avionics.
  - 02.02 Understand the various factors of aircraft performance, including takeoff, enroute and landing limitations and weight and balance.
  - 02.03 Demonstrate knowledge of the function of flight operations, including pilot hiring, training, standards, safety issues, security issues, FAA and TSA regulations, documentation requirements, operations specifications, and crew scheduling as well as flight attendant and dispatcher requirements.
  - 02.04 Describe how airline maintenance operates and its role and effect on flight operations, with both scheduled and non-scheduled maintenance.
  - 02.05 Demonstrate an understanding of the role of the flight operations professional in the economic and planning functions of an airline.
  - 02.06 Explain FAA requirements such as flight standards, types of certificates, training and record keeping surveillance and investigations as well as the operator's response and its relationship with the FAA.
  - 02.07 Describe the role of the National Transportation Safety Board in accident investigation as well as NASA's role in aviation safety reporting systems and research.
  - 02.08 Demonstrate knowledge of the application of information technology systems in flight operations as they relate to flight planning systems, flight management

systems, satellite communication and navigation systems, weight and balance, cockpit displays and automation, maintenance monitoring and management information systems.

03.0 Demonstrate an understanding of airline customer service.--The student will be able to:

- 03.01 Analyze why a customer buys a particular product or service.
- 03.02 Describe the factors of success in customer service.
- 03.03 Explain how to deliver quality customer service.
- 03.04 Demonstrate an understanding of why companies lose customers and how to recover a customer from a bad experience.

04.0 Demonstrate an understanding of air cargo operations and procedures.--The student will be able to:

- 04.01 Describe the importance of air cargo to the economy.
- 04.02 Discuss the different types of customers and how marketing is done in the air cargo industry.
- 04.03 Explain the role of freight forwarders and customs brokers.
- 04.04 Explain the different classes of cargo, such as general, high value and perishable, including live animals.
- 04.05 Demonstrate an understanding of the documentation requirements for air cargo, such as airway bills, insurance and customs documents.
- 04.06 Describe the packing requirements for air cargo.
- 04.07 Discuss the variety of ways that cargo is loaded on aircraft, including pallets and different sizes and types of containers and the loading equipment that is used.
- 04.08 Explain the weight and balance restrictions that apply to air cargo aircraft.
- 04.09 Describe the classification and identification of the nine classes of hazardous goods and their labeling and packaging requirements and shipping limitations and restrictions.
- 04.10 Discuss what procedures to follow in the case of a dangerous goods accident or incident.
- 04.11 Describe the security requirements for air cargo personnel, facilities and aircraft.

05.0 Demonstrate employability skills. --The student will be able to:

- 05.01 Conduct a job search.
- 05.02 Secure information about a job.
- 05.03 Identify documents, which may be required when applying for a job interview.
- 05.04 Complete a job application form correctly.
- 05.05 Create an appropriate employer/job focused resume.
- 05.06 Demonstrate competence in job interview techniques.
- 05.07 Describe appropriate behavior on the job, including acceptable work and health habits.
- 05.08 Discuss examples of employer discipline, reward and attendance programs as applied to employees.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Airport Management  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0649010405
Program Type	College Credit Certificate (CCC)
Program Length	16 credit hours
CTSO	SkillsUSA
SOC Codes (all applicable)	53-2021
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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.

A part of the AS degree in Aviation Administration, the purpose of this certificate program is to prepare students who are seeking employment a fast track in the airport management field. Some of the students will be able to obtain opportunities in the federal, state and local government aviation fields, some will find opportunities in initial entry level jobs in airport customer service and operations as well as lower to middle level management positions. Others will find positions in supporting aviation entities, such as suppliers and service providers to government aviation agencies. This program will benefit both students who do not have any other college experience, as well as those who have an associate or bachelor's degree in another area and would like to acquire the specific skills in this area.

The content includes but is not limited to, communication skills, leadership skills, directing, planning and controlling, human relations and employability skills, safe and efficient work practices, airport facilities and planning, security issues, Federal Aviation Regulations, and other law related to aviation/airports.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate an understanding of basic aviation terminology and history.
- 02.0 Demonstrate an understanding of aviation operations practices, limitations and procedures.
- 03.0 Demonstrate an understanding of federal, state and other governmental laws, rules and policies as they relate to aviation.
- 04.0 Demonstrate an understanding of airport management practices, including leadership, communications, directing, planning and controlling.
- 05.0 Demonstrate an understanding of aviation security issues and responses.
- 06.0 Demonstrate employability skills.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Airport Management  
**CIP Number:** 0649010405  
**Program Length:** 16 credit hours  
**SOC Code(s):** 53-2021

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402). At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of basic aviation terminology and history.--The student will be able to:
- 01.01 Explain the overall scope and breadth of the aviation industry including its impact on the economy.
  - 01.02 Distinguish the terms and vocabularies that are used in the Aerospace and Commercial Aviation Industry.
  - 01.03 Describe the history of technological, governmental, social and economic developments of aviation.
  - 01.04 Explain the different types and categories of aircraft in use in the industry by distinguishing and identifying: Various wide body, narrow body types and general aviation aircraft.
  - 01.05 Demonstrate an understanding of the oversight role of the Federal Government and its effect on the aviation industry.
- 02.0 Demonstrate an understanding of aviation operations practices, limitations and procedures. --The student will be able to:
- 02.01 Demonstrate knowledge of aircraft systems as they apply to flight operations, including engines, fuel, electrical, hydraulics, pneumatics, flight controls and avionics.
  - 02.02 Understand the various factors of aircraft performance, including takeoff, enroute and landing limitations and weight and balance.
  - 02.03 Demonstrate knowledge of the function of flight operations, including pilot hiring, training, standards, safety issues, security issues, FAA and TSA regulations, documentation requirements, operations specifications, and crew scheduling as well as flight attendant and dispatcher requirements.
  - 02.04 Describe how airline maintenance operates and its role and effect on flight operations, with both scheduled and non-scheduled maintenance.
  - 02.05 Demonstrate an understanding of the role of the flight operations professional in the economic and planning functions of an airline.
  - 02.06 Explain FAA requirements such as flight standards, types of certificates, training and record keeping, surveillance and investigations as well as the operator's response and its relationship with the FAA.
  - 02.07 Describe the role of the National Transportation Safety Board in accident investigation as well as NASA's role in aviation safety reporting systems and research.
  - 02.08 Demonstrate knowledge of the application of information technology systems in flight operations as they relate to flight planning systems, flight management

systems, satellite communication and navigation systems, weight and balance, cockpit displays and automation, maintenance monitoring and management information systems.

03.0 Demonstrate an understanding of federal, state and other governmental laws, rules and policies as they relate to aviation.--The student will be able to:

- 03.01 Demonstrate knowledge of the history and foundations of the legal system in the United States and the historical development of aviation law.
- 03.02 Describe the state and federal system of trial, appellate and supreme courts as well as subject matter jurisdiction.
- 03.03 Distinguish the role and function of the US Department of Transportation, Federal Aviation Administration, Transport Security Administration and the National Transportation Safety Board as it relates to their legal responsibilities and the federal statutes that give them their authority as well as the process of creating and enforcing applicable regulations.
- 03.04 Demonstrate a knowledge of airman rights and responsibilities, including negligence, FAA enforcement, immunity, and degrees of care.
- 03.05 Explain state aviation law, relating to airports, fixed based operators, aircraft sales, registration and taxation issues.
- 03.06 Understand the legal issues relating to the aircraft manufacturing and the airline industry, including warranties, products liability, negligence, accident litigation, consumer issues and labor issues.
- 03.07 Demonstrate knowledge of international air law, including the Warsaw Convention, the Chicago Convention, bilateral and multilateral agreements, the International Civil Aviation Organization, and the International Air Transport Association as well as issues of international jurisdiction, limits of liability and damages.
- 03.08 Understand the legal issues that relate to aviation security issues, including hijacking and bomb threats.

04.0 Demonstrate an understanding of airport management practices, including leadership, communications, directing, planning and controlling. --The student will be able to:

- 04.01 Understand the historical aspects of the science of management as it has developed in the U.S. including how the changing economy and technology affected the development of management techniques.
- 04.02 Describe the various environments that airport management have to deal with in evaluating what factors will affect their organization, such as changes in competition, economics, social factors, government policies and technology.
- 04.03 Describe the various philosophies of organizational design and how this applies to the airports. This will include: Pyramidal structures, matrix structures and amorphous project type structures.
- 04.04 Demonstrate an understanding of the various functions of an airport, including airside and landside operations and management, and financial planning, including airport master plans, environmental issues and land use.
- 04.05 Describe the factors of effective communication in an airport environment, such as: Effective listening, minimizing levels of communication, using technology properly, and both formal and informal communication methods.

- 04.06 Describe the various methods of motivation for employees in an airport environment, such as: Reward systems, negative incentives, empowerment and teams versus individual performance.
  - 04.07 Demonstrate an understanding of labor relations in an airport environment including the framework of applicable law, how a contract negotiation works and how a grievance process works.
  - 04.08 Describe the effect of various leadership styles that are used in the airport environment, including, an authoritative style, a participative style and a laissez-faire style.
  - 04.09 Demonstrate an understanding of the various control processes used in the airport industry, such as: Budgets and audits, physical performance, such as on-time performance and customer complaints and quality issues.
  - 04.10 Describe the processes involved with strategic planning and how it is used airport industry. This includes: Forecasting of demand, deciding levels of operations, and developing an operational schedule.
- 05.0 Demonstrate an understanding of aviation security issues and responses.--The student will be able to:
- 05.01 Describe the types of threats that can be encountered in civil aviation including bomb threats, and actual bombs, hijackings/air piracy, aggressive/disruptive passengers, and crew and security problems.
  - 05.02 Discuss the law of aviation security, such the Aviation Safety and Security Act of 2001, and FAR Parts 108 and 109.
  - 05.03 Describe the components of a layered aviation security system.
  - 05.04 Demonstrate an understanding of the need for planning for all possible security threats, and having contingency plans and responsive measures.
  - 05.05 Explain the specific factors of ground security threats, including restricted access, inspections of personnel baggage and goods.
  - 05.06 Discuss possible airborne threats and procedures to deal with those, such as maintaining flight deck integrity and Air Marshals.
  - 05.07 Demonstrate an understanding of the technologies that are used in aviation security, as well as effective screening techniques.
  - 05.08 Explain personnel selection, training and methods for maintaining appropriate job performance for security personnel.
- 06.0 Demonstrate employability skills.--The student will be able to:
- 06.01 Conduct a job search.
  - 06.02 Secure information about a job.
  - 06.03 Identify documents, which may be required when applying for a job interview.
  - 06.04 Complete a job application form correctly.
  - 06.05 Create an appropriate employer/job focused resume.
  - 06.06 Demonstrate competence in job interview techniques.
  - 06.07 Describe appropriate behavior on the job, including acceptable work and health habits.
  - 06.08 Discuss examples of employer discipline, reward and attendance programs as applied to employees.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Passenger Service Agent  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0649010406
Program Type	College Credit Certificate (CCC)
Program Length	16 credit hours
CTSO	SkillsUSA
SOC Codes (all applicable)	43-4051
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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.

A part of the AS degree in Aviation Administration, the purpose of this program is to prepare students who are seeking employment in the aviation/airline/airport fields as a passenger service agent. Some of the students will be able to obtain opportunities in the federal, state and local government aviation fields, while others will find opportunities in airline fields, such as initial entry level jobs in customer service and operations and ticketing.

The content includes but is not limited to, communication skills, customer service skills, ticketing and reservations, aviation security, human relations and employability skills, operations and terminology.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

## **Standards**

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

- 01.0 Demonstrate an understanding of aviation operations practices, limitations and procedures.
- 02.0 Demonstrate an understanding of aviation security issues and responses.
- 03.0 Demonstrate an understanding of aviation/airline marketing, customer service/sales distribution/and reservations/ticketing.
- 04.0 Demonstrate employability skills.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Passenger Service Agent  
**CIP Number:** 0649010406  
**Program Length:** 16 credit hours  
**SOC Code(s):** 43-4051

This certificate program is part of the Aviation Administration AS/AAS degree program (1649010402). At the completion of this program, the student will be able to:

01.0 Demonstrate an understanding of aviation operations practices, limitations and procedures.--The student will be able to:

- 01.01 Demonstrate knowledge of aircraft systems as they apply to flight operations, including engines, fuel, electrical, hydraulics, pneumatics, flight controls and avionics.
- 01.02 Understand the various factors of aircraft performance, including takeoff, enroute and landing limitations and weight and balance.
- 01.03 Demonstrate knowledge of the function of flight operations, including pilot hiring, training, standards, safety issues, security issues, FAA and TSA regulations, documentation requirements, operations specifications, and crew scheduling as well as flight attendant and dispatcher requirements.
- 01.04 Describe how airline maintenance operates and its role and effect on flight operations, with both scheduled and non-scheduled maintenance.
- 01.05 Demonstrate an understanding of the role of the flight operations professional in the economic and planning functions of an airline.
- 01.06 Explain FAA requirements such as flight standards, types of certificates, training and record keeping, surveillance and investigations as well as the operator's response and its relationship with the FAA.
- 01.07 Describe the role of the National Transportation Safety Board in accident investigation as well as NASA's role in aviation safety reporting systems and research.
- 01.08 Demonstrate knowledge of the application of information technology systems in flight operations as they relate to flight planning systems, flight management systems, satellite communication and navigation systems, weight and balance, cockpit displays and automation, maintenance monitoring and management information systems.

02.0 Demonstrate an understanding of aviation security issues and responses.--The student will be able to:

- 02.01 Describe the types of threats that can be encountered in civil aviation including bomb threats, and actual bombs, hijackings/air piracy, aggressive/disruptive passengers, and crew and security problems.
- 02.02 Discuss the law of aviation security, such the Aviation Safety and Security Act of 2001, and FAR Parts 108 and 109.
- 02.03 Describe the components of a layered aviation security system.
- 02.04 Demonstrate an understanding of the need for planning for all possible security threats, and having contingency plans and responsive measures.

- 02.05 Explain the specific factors of ground security threats, including restricted access, inspections of personnel baggage and goods.
  - 02.06 Discuss possible airborne threats and procedures to deal with those, such as maintaining flight deck integrity and Air Marshals.
  - 02.07 Demonstrate an understanding of the technologies that are used in aviation security, as well as effective screening techniques.
  - 02.08 Explain personnel selection, training and methods for maintaining appropriate job performance for security personnel.
- 03.0 Demonstrate an understanding of aviation/airline marketing, customer service/sales distribution and reservations and ticketing.--The student will be able to:
- 03.01 Explain the Marketing Concept and how it differs from the Product and sales Concepts.
  - 03.02 Analyze the various environmental factors that affect aviation/airline marketing.
  - 03.03 Demonstrate an understanding of market demographics and segmentation.
  - 03.04 Explain the methods of market research.
  - 03.05 Analyze why a customer buys a particular product or service.
  - 03.06 Explain the different media that are available for airline industry advertising and promotion, and the advantages and disadvantages of each.
  - 03.07 Describe pricing strategies that are used by the airlines.
  - 03.08 Describe the factors of success in customer service.
  - 03.09 Explain how to deliver quality customer service.
  - 03.10 Demonstrate an understanding of why companies lose customers and how to recover a customer from a bad experience.
  - 03.11 Explain the principles of reservations, including passenger name records, flight schedules, availability and fares.
  - 03.12 Discuss the procedure of airline ticketing, including fares, one way, round trip, change rules, refunds, taxes charges and interline agreements.
  - 03.13 Explain the process of internet reservations, e-ticketing and travel agency functions.
- 04.0 Demonstrate employability skills.--The student will be able to:
- 04.01 Conduct a job search.
  - 04.02 Secure information about a job.
  - 04.03 Identify documents, which may be required when applying for a job interview.
  - 04.04 Complete a job application form correctly.
  - 04.05 Create an appropriate employer/job focused resume.
  - 04.06 Demonstrate competence in job interview techniques.
  - 04.07 Describe appropriate behavior on the job, including acceptable work and health habits.
  - 04.08 Discuss examples of employer discipline, reward and attendance programs as applied to employees.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Supply Chain Management  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>AS</b>	<b>AAS</b>
CIP Number	1652020900	0652020900
Program Type	College Credit	College Credit
Standard Length	64 credit hours	64 credit hours
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	11-3071, 53-1031	11-3071, 53-1031
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	

### **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: related business and accounting practices such as standard policies and operating procedures, negotiation techniques, planning, organizing, logistics concepts, purchasing and inventory control theory. Emphasis is placed on the development of business and managerial skills necessary for the efficient and effective performance of all operations within a company's supply chain.

The purpose of this program is to prepare students for initial employment with an occupational title or to provide supplemental training for persons previously or currently employed in these occupations with cross-functional skills necessary for planning, acquisition, flow and distribution of goods and services.

This program prepares students for employment in occupations such as: Integrated Logistics Planner, Purchasing Analyst, Cargo Scheduler, International Logistics Specialist, Quality Manager, Claims Associate, Inventory Control Manager, Rail Fleet Management Specialist, Contract Specialist, Logistics Analyst, Sourcing Agent, Customer Service Manager, Materials Analyst, Supply Chain Engineer, Director of Inventory Management, Materials Manager, Supply



Program Manager, Dispatcher, Operations Research Manager, Supply Technician, Distribution Area Manager, Operations Supervisor, Traffic Manager, Distribution Center Operations Manager, Order Fulfillment Supervisor, Transportation Coordinator, Distribution Planning Analyst, Packaging Supervisor, Transportation Manager, Expedited Cargo Sales, Plant Receiving/Shipping Supervisor, Transportation Solutions Director, Facilities Supervisor, Procurement Clerk/Technician, Warehouse Operations Supervisor, Forecaster Product Manager-Tracing and Tracking, Warehouse Shift Supervisor, Import/Export Analyst, Purchasing Agent.

## **Program Structure**

This program is a planned sequence of instruction consisting of 64 credit hours.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

Consideration should be given to offering an internship or cooperative work experience for those students who are not already working in the supply chain industry, or who wish to gain experience in their chosen future career paths, such as Logistics Technician, Inventory Analyst, Inventory Control Specialist, Materials Planner /Scheduler, Purchasing Assistant, Shipping and Receiving Specialist, Transportation Planner/Coordinator, and Warehouse Specialist.

Whenever the cooperative or internship method of instruction is offered the following is required for each student: a training plan, signed by the student, faculty and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work environment which reflects equipment, skills and tasks relevant to the occupation the student has chosen as a career goal.

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Articulation**

To be transferable statewide between institutions, this program must have been reviewed, and a “transfer value” assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific articulation agreements with each other.

For details on existing articulation agreements, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Program Length**

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. The standard length of this program is 64 credit hours according to Rule 6A-14.030, F.A.C.

### **Certificate Programs**

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS/AAS degree program includes the following College Credit Certificates:

Logistics and Transportation Specialist (0652020901) – 18 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

### **Standards**

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

- 01.0 Demonstrate an understanding of Professional Development and Networking
- 02.0 Demonstrate an understanding of Professional Effectiveness
- 03.0 Demonstrate an understanding of Logistics, and Supply Chain Management Basics
- 04.0 Demonstrate an understanding of Transportation Systems
- 05.0 Demonstrate an understanding of Warehousing and Materials Handling
- 06.0 Demonstrate an understanding of Packaging
- 07.0 Demonstrate an understanding of Inventory and Supply Planning
- 08.0 Demonstrate an understanding of Supply Chain Management
- 09.0 Demonstrate an understanding of Reverse Logistics
- 10.0 Demonstrate an understanding of Purchasing/Contracting
- 11.0 Demonstrate an understanding of Production
- 12.0 Demonstrate an understanding of Product Management

- 13.0 Demonstrate an understanding of Pricing
- 14.0 Demonstrate an understanding of Customer Relationship Management
- 15.0 Demonstrate an appropriate Finance Skills
- 16.0 Demonstrate an understanding of Management Practices
- 17.0 Demonstrate an understanding of Risk Management
- 18.0 Demonstrate an understanding of Project and Quality Management
- 19.0 Demonstrate an understanding of Business Law, Ethics and Legal Issues
- 20.0 Demonstrate an understanding of Economics
- 21.0 Demonstrate an understanding of Marketing Information Management
- 22.0 Demonstrate an understanding of Market Research
- 23.0 Demonstrate an understanding of Writing Documentation
- 24.0 Demonstrate an understanding of Information Technology Applications
- 25.0 Demonstrate an understanding of Knowledge-Management

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Supply Chain Management  
**CIP Numbers:** 1652020900 AS, 0652020900 AAS  
**Program Length:** 64 credit hours  
**SOC Code(s):** 11-3071

The AS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS, and it must be transferable according to Rule 6A-14.030 (2), F.A.C. The AAS degree requires the inclusion of a minimum of 15 credits of general education coursework according to SACS. At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of professional development and networking--The student will be able to:
- 01.01 Explore career pathways in procurement, acquisition, logistics, and supply chain management
  - 01.02 Explore professional development opportunities for a procurement, acquisition, logistics, and supply chain management professional
  - 01.03 Utilize professional marketing/research resource materials
  - 01.04 Prepare for career advancement in procurement, acquisition, logistics, and supply chain management
- 02.0 Demonstrate an understanding of professional effectiveness--The student will be able to:
- 02.01 Explain professional responsibilities in procurement, acquisition, logistics, and supply chain management
  - 02.02 Develop self-management skills
  - 02.03 Demonstrate appropriate work ethics as they apply to procurement, acquisition, logistics, and supply chain management
  - 02.04 Apply problem-solving techniques
  - 02.05 Manage stressful situations
  - 02.06 Build professional communication skills
  - 02.07 Disseminate information
  - 02.08 Develop and achieve goals
  - 02.09 Manage change
- 03.0 Demonstrate an understanding of logistics, and supply chain management basics--The student will be able to:
- 03.01 Characterize the nature of business
  - 03.02 Describe the role of marketing
  - 03.03 Explain the nature and scope of logistics
- 04.0 Demonstrate an understanding of transportation systems--The student will be able to:
- 04.01 Assess the importance of the transportation system
  - 04.02 Explain the scope of the domestic and global transportation system

- 04.03 Describe various services in the transportation industry and how these services are coordinated
  - 04.04 Explain the infrastructure and equipment used by the various modes of transportation
  - 04.05 Determine the costs/benefits of company-owned versus for-hire transportation
  - 04.06 Explain the scope of international transportation
  - 04.07 Explain the complexities of international transportation
  - 04.08 Explain the general costs included in transportation rates
  - 04.09 Analyze rate structures
  - 04.10 Determine line-haul rates
  - 04.11 Explain various transportation documents
  - 04.12 Explain procedures to expedite deliveries and conduct follow-up procedures as needed
- 05.0 Demonstrate an understanding of warehousing and materials handling--The student will be able to:
- 05.01 Explain the reasons for maintaining warehousing
  - 05.02 Explain the functions of warehouses
  - 05.03 Compare and contrast public and private warehouses
  - 05.04 Explain various warehouse documents
  - 05.05 Describe materials handling functions
  - 05.06 Explain the elements that influence space layout in warehousing (e.g. productivity, damage, safety, etc.)
  - 05.07 Use the various methods to conduct cost-benefit analysis
  - 05.08 Explain the product characteristics that impact logistics
  - 05.09 Explain order fulfillment procedures
- 06.0 Demonstrate an understanding of packaging--The student will be able to:
- 06.01 Assess types of packaging
  - 06.02 Explain the functions of packaging
  - 06.03 Explain how packaging influences other logistic activities
- 07.0 Demonstrate an understanding of inventory and supply planning--The student will be able to:
- 07.01 Explain the importance of inventory
  - 07.02 Explain how inventory management is measured
  - 07.03 Analyze Just-in Time (JIT) inventory process
  - 07.04 Analyze the Materials Requirement Planning (MRP) system
  - 07.05 Analyze types of products and their impact on logistics
  - 07.06 Explain the disposition of assets
- 08.0 Demonstrate an understanding supply chain management--The student will be able to:
- 08.01 Explain the concept of Supply Chain Management (SCM)
  - 08.02 Evaluate Supply Chain Management (SCM)
- 09.0 Demonstrate an understanding of reverse logistics--The student will be able to:

- 09.01 Assess the nature and scope of reverse logistics
- 09.02 Explain the waste management process
  
- 10.0 Demonstrate an understanding of purchasing/contracting--The student will be able to:
  - 10.01 Develop a procurement/acquisition plan
  - 10.02 Analyze organizational requirements for purchasing requisitions
  - 10.03 Determine appropriate methods of procurement
  - 10.04 Work collaboratively to develop and review specifications, statements of work, performance terms, and/or acceptance criteria
  - 10.05 Identify and select potential sources of materials or services
  - 10.06 Explain competitive bids, quotations, and proposals
  - 10.07 Prepare and solicit competitive bids, quotations, and proposals
  - 10.08 Evaluate competitive bids to determine the best offer
  - 10.09 Conduct supplier visits and/or evaluations to determine suitability when needed
  - 10.10 Analyze elements of contracts
  - 10.11 Issue contracts
  - 10.12 Review legal implications of contracting
  - 10.13 Manage contracts and purchase orders from award to completion
  - 10.14 Resolve contract and/or purchase order differences with suppliers
  - 10.15 Explain payment problems with suppliers and user departments
  - 10.16 Discuss the scope of compliance requirements
  - 10.17 Conduct a negotiation
  
- 11.0 Demonstrate an understanding of production--The student will be able to:
  - 11.01 Explain the relationship between manufacturing, purchasing, and logistics
  - 11.02 Explain the concept of production
  - 11.03 Plan production
  - 11.04 Apply best practices for production operations
  - 11.05 Explain impact of new production technology for profitability
  - 11.06 Analyze job costing
  
- 12.0 Demonstrate an understanding of product management--The student will be able to:
  - 12.01 Describe the factors involved in product/service operations
  - 12.02 Plan product/service management strategies
  - 12.03 Explain types of products and their impact on logistics
  - 12.04 Explain the impact of packaging on product/service management
  - 12.05 Use selling processes and techniques
  - 12.06 Explain the nature and scope of promotion
  
- 13.0 Demonstrate an understanding of pricing--The student will be able to:
  - 13.01 Explain pricing fundamentals
  - 13.02 Evaluate pricing fundamentals
  - 13.03 Explain how logistics cost can influence pricing decisions
  - 13.04 Determine prices for products/services
  
- 14.0 Demonstrate an understanding of customer relationship management--The student will be able to:

- 14.01 Explain basic Customer Relationship Management (CRM) concepts
  - 14.02 Demonstrate quality customer service focus
  - 14.03 Describe the concept of order cycle time
  - 14.04 Explain the importance of logistic performance on customer service in generating revenue
  - 14.05 Explain the role of technology in order processing, tracking, and customer research
  - 14.06 Process orders and returns
- 15.0 Demonstrate an appropriate finance skills--The student will be able to:
- 15.01 Explain how logistic costs impact net profit
  - 15.02 Utilize various inventory valuation methods
  - 15.03 Explain the impact of logistics on time value of money
- 16.0 Demonstrate an understanding of management practices--The student will be able to:
- 16.01 Explain management concepts
  - 16.02 Assess and manage human resources and integrated teams
  - 16.03 Provide leadership to procurement, acquisition, logistic, and supply chain management employees
  - 16.04 Apply sound decision-making strategies
- 17.0 Demonstrate an understanding of risk management--The student will be able to:
- 17.01 Explain types of risk
  - 17.02 Explain risk management
  - 17.03 Analyze safety/security risks
- 18.0 Demonstrate an understanding of project and quality management--The student will be able to:
- 18.01 Plan and coordinate the diverse components of a project
  - 18.02 Assess and manage a project
  - 18.03 Build interpersonal skills with individuals and teams
  - 18.04 Explain quality assurance
  - 18.05 Select and employ quality tools
  - 18.06 Examine quality cost implications
- 19.0 Demonstrate an understanding of business law, ethics and legal issues--The student will be able to:
- 19.01 Review and discuss current legal and ethical considerations as they relate to procurement, acquisition, logistics, and supply chain management
  - 19.02 Evaluate policies for managing privacy and ethical issues
- 20.0 Demonstrate an understanding of economics--The student will be able to:
- 20.01 Compare basic features of different economic systems
  - 20.02 Explain importance of resources to the economy

- 20.03 Explain concept of organized labor and business
  - 20.04 Apply business economic concepts
  - 20.05 Analyze economic indicators and trends
  - 20.06 Explain measures used to analyze economic conditions
  - 20.07 Explain the nature of international trade
  - 20.08 Explain the impact of cultural and social environments on world trade
  - 20.09 Compare/contrast influences on a nation's ability to trade
- 21.0 Demonstrate an understanding of marketing information management--The student will be able to:
- 21.01 Explain procurement, acquisition, logistics, and supply chain management information management
  - 21.02 Explain use of databases in organizing marketing data
  - 21.03 Use database information analysis
  - 21.04 Write marketing reports
  - 21.05 Present marketing report findings and recommendations
  - 21.06 Explain the scope of demand forecasting
  - 21.07 Forecast demand
  - 21.08 Examine data using common statistical procedures
  - 21.09 Develop a marketing plan
- 22.0 Demonstrate an understanding of market research--The student will be able to:
- 22.01 Describe market research
  - 22.02 Differentiate between basic market research tools
  - 22.03 Use online market research tools
  - 22.04 Use data collection methods
  - 22.05 Analyze information from various sources
  - 22.06 Evaluate and conduct research
- 23.0 Demonstrate an understanding of writing documentation--The student will be able to:
- 23.01 Assess report writing requirements
  - 23.02 Write reports
- 24.0 Demonstrate an understanding of information technology applications--The student will be able to:
- 24.01 Explain the concepts and use of various information technologies in logistics
  - 24.02 Describe the impact of technology on society
  - 24.03 Describe types of business software
  - 24.04 Describe Internet-based business
  - 24.05 Select and apply information technology application for procurement, acquisition, logistics, and supply chain management
  - 24.06 Access the Internet
  - 24.07 Utilize Internet services
- 25.0 Demonstrate an understanding of knowledge-management--The student will be able to:
- 25.01 Explore knowledge-management



- 25.02 Analyze importance of capture and transfer of strategic knowledge
- 25.03 Analyze organizational culture and the role of knowledge-management
- 25.04 Determine barriers that affect knowledge-management implementation
- 25.05 Evaluate various knowledge-management measurement approaches
- 25.06 Measure intellectual capital

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Logistics and Transportation Specialist  
**Career Cluster:** Transportation, Distribution and Logistics

<b>CCC</b>	
CIP Number	0652020901
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	SkillsUSA
SOC Codes (all applicable)	11-3071, 53-1031
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Supply Chain Management AS/AAS degree program (0652020900).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

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 purpose of this program is to prepare students for initial employment with an occupational title or to provide supplemental training for persons previously or currently employed in these occupations with cross-functional skills necessary for planning, acquisition, flow and distribution of goods and services. This certificate prepares students for occupations as: Integrated Logistics Planner, Purchasing Analyst, Cargo Scheduler, International Logistics Specialist, , Rail Fleet Management Specialist, Contract Specialist, Logistics Analyst, Sourcing Agent, Customer Service Manager, Materials Analyst, Supply Chain Engineer, Dispatcher, Supply Technician, Distribution Area Manager, Operations Supervisor, Traffic Manager, Distribution Center Operations Manager, Order Fulfillment Supervisor, Transportation Coordinator, Distribution Planning Analyst, Packaging Supervisor, Transportation Manager, Expedited Cargo Sales, Plant Receiving/Shipping Supervisor, Transportation Solutions Director, Facilities Supervisor, Procurement Clerk/Technician, Warehouse Operations Supervisor, Forecaster Product Manager-Tracing and Tracking, Warehouse Shift Supervisor, Import/Export Analyst, Purchasing Agent.

The content includes but is not limited to: related business and accounting practices such as standard policies and operating procedures, negotiation techniques, planning, organizing, logistics concepts, purchasing and inventory control theory. Emphasis is placed on the development of business and managerial skills necessary for the efficient and effective performance of all operations within a company's supply chain.

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

#### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

#### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

### **Standards**

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

- 01.0 Demonstrate an understanding of Professional Development and Networking
- 02.0 Demonstrate an understanding of Professional Effectiveness
- 03.0 Demonstrate an understanding of Logistics, and Supply Chain Management Basics
- 04.0 Demonstrate an understanding of Transportation Systems
- 05.0 Demonstrate an understanding of Warehousing and Materials Handling
- 06.0 Demonstrate an understanding of Packaging
- 07.0 Demonstrate an understanding of Inventory and Supply Planning
- 08.0 Demonstrate an understanding of Supply Chain Management

- 09.0 Demonstrate an understanding of Reverse Logistics
- 10.0 Demonstrate an understanding of Purchasing/Contracting
- 11.0 Demonstrate an understanding of Production
- 12.0 Demonstrate an understanding of Product Management
- 13.0 Demonstrate an understanding of Pricing
- 14.0 Demonstrate an understanding of Customer Relationship Management
- 16.0 Demonstrate an understanding of Management Practices
- 17.0 Demonstrate an understanding of Risk Management
- 18.0 Demonstrate an understanding of Project and Quality Management
- 19.0 Demonstrate an understanding of Business Law, Ethics and Legal Issues
- 23.0 Demonstrate an understanding of Writing Documentation
- 24.0 Demonstrate an understanding of Information Technology Applications
- 25.0 Demonstrate an understanding of Knowledge-Management

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:** Logistics and Transportation Specialist  
**CIP Number:** 0652020901  
**Program Length:** 18 credit hours  
**SOC Code(s):** 11-3071

This certificate program is part of the Supply Chain Management AS/AAS degree program (0652020900). At the completion of this program, the student will be able to:

- 01.0 Demonstrate an understanding of professional development and networking--The student will be able to:
- 01.01 Explore career pathways in procurement, acquisition, logistics, and supply chain management
  - 01.02 Explore professional development opportunities for a procurement, acquisition, logistics, and supply chain management professional
  - 01.03 Utilize professional marketing/research resource materials
  - 01.04 Prepare for career advancement in procurement, acquisition, logistics, and supply chain management
- 02.0 Demonstrate an understanding of professional effectiveness--The student will be able to:
- 02.01 Explain professional responsibilities in procurement, acquisition, logistics, and supply chain management
  - 02.02 Develop self-management skills
  - 02.03 Demonstrate appropriate work ethics as they apply to procurement, acquisition, logistics, and supply chain management
  - 02.04 Apply problem-solving techniques
  - 02.05 Manage stressful situations
  - 02.06 Build professional communication skills
  - 02.07 Disseminate information
  - 02.08 Develop and achieve goals
  - 02.09 Manage change
- 03.0 Demonstrate an understanding of logistics, and supply chain management basics--The student will be able to:
- 03.01 Characterize the nature of business
  - 03.02 Describe the role of marketing
  - 03.03 Explain the nature and scope of logistics
- 04.0 Demonstrate an understanding of transportation systems--The student will be able to:
- 04.01 Assess the importance of the transportation system
  - 04.02 Explain the scope of the domestic and global transportation system
  - 04.03 Describe various services in the transportation industry and how these services are coordinated

- 04.04 Explain the infrastructure and equipment used by the various modes of transportation
  - 04.05 Determine the costs/benefits of company-owned versus for-hire transportation
  - 04.06 Explain the scope of international transportation
  - 04.07 Explain the complexities of international transportation
  - 04.08 Explain the general costs included in transportation rates
  - 04.09 Analyze rate structures
  - 04.10 Determine line-haul rates
  - 04.11 Explain various transportation documents
  - 04.12 Explain procedures to expedite deliveries and conduct follow-up procedures as needed
- 05.0 Demonstrate an understanding of warehousing and materials handling--The student will be able to:
- 05.01 Explain the reasons for maintaining warehousing
  - 05.02 Explain the functions of warehouses
  - 05.03 Compare and contrast public and private warehouses
  - 05.04 Explain various warehouse documents
  - 05.05 Describe materials handling functions
  - 05.06 Explain the elements that influence space layout in warehousing (e.g. productivity, damage, safety, etc.)
  - 05.07 Use the various methods to conduct cost-benefit analysis
  - 05.08 Explain the product characteristics that impact logistics
  - 05.09 Explain order fulfillment procedures
- 06.0 Demonstrate an understanding of packaging--The student will be able to:
- 06.01 Assess types of packaging
  - 06.02 Explain the functions of packaging
  - 06.03 Explain how packaging influences other logistic activities
- 07.0 Demonstrate an understanding of inventory and supply planning--The student will be able to:
- 07.01 Explain the importance of inventory
  - 07.02 Explain how inventory management is measured
  - 07.03 Analyze Just-in Time (JIT) inventory process
  - 07.04 Analyze the Materials Requirement Planning (MRP) system
  - 07.05 Analyze types of products and their impact on logistics
  - 07.06 Explain the disposition of assets
- 08.0 Demonstrate an understanding supply chain management - the student will be able to:
- 08.01 Explain the concept of Supply Chain Management (SCM)
  - 08.02 Evaluate Supply Chain Management (SCM)
- 09.0 Demonstrate an understanding of reverse logistics--The student will be able to:
- 09.01 Assess the nature and scope of reverse logistics
  - 09.02 Explain the waste management process

10.0 Demonstrate an understanding of purchasing/contracting--The student will be able to:

- 10.01 Develop a procurement/acquisition plan
- 10.02 Analyze organizational requirements for purchasing requisitions
- 10.03 Determine appropriate methods of procurement
- 10.04 Work collaboratively to develop and review specifications, statements of work, performance terms, and/or acceptance criteria
- 10.05 Identify and select potential sources of materials or services
- 10.06 Explain competitive bids, quotations, and proposals
- 10.07 Prepare and solicit competitive bids, quotations, and proposals
- 10.08 Evaluate competitive bids to determine the best offer
- 10.09 Conduct supplier visits and/or evaluations to determine suitability when needed
- 10.10 Analyze elements of contracts
- 10.11 Issue contracts
- 10.12 Review legal implications of contracting
- 10.13 Manage contracts and purchase orders from award to completion
- 10.14 Resolve contract and/or purchase order differences with suppliers
- 10.15 Explain payment problems with suppliers and user departments
- 10.16 Discuss the scope of compliance requirements
- 10.17 Conduct a negotiation

11.0 Demonstrate an understanding of production--The student will be able to:

- 11.01 Explain the relationship between manufacturing, purchasing, and logistics
- 11.02 Explain the concept of production
- 11.03 Plan production
- 11.04 Apply best practices for production operations
- 11.05 Explain impact of new production technology for profitability
- 11.06 Analyze job costing

12.0 Demonstrate an understanding of product management--The student will be able to:

- 12.01 Describe the factors involved in product/service operations
- 12.02 Plan product/service management strategies
- 12.03 Explain types of products and their impact on logistics
- 12.04 Explain the impact of packaging on product/service management
- 12.05 Use selling processes and techniques
- 12.06 Explain the nature and scope of promotion

13.0 Demonstrate an understanding of pricing--The student will be able to:

- 13.01 Explain pricing fundamentals
- 13.02 Evaluate pricing fundamentals
- 13.03 Explain how logistics cost can influence pricing decisions
- 13.04 Determine prices for products/services

14.0 Demonstrate an understanding of customer relationship management--The student will be able to:

- 14.01 Explain basic Customer Relationship Management (CRM) concepts

- 14.02 Demonstrate quality customer service focus
  - 14.03 Describe the concept of order cycle time
  - 14.04 Explain the importance of logistic performance on customer service in generating revenue
  - 14.05 Explain the role of technology in order processing, tracking, and customer research
  - 14.06 Process orders and returns
- 16.0 Demonstrate an understanding of management practices--The student will be able to:
- 16.01 Explain management concepts
  - 16.02 Assess and manage human resources and integrated teams
  - 16.03 Provide leadership to procurement, acquisition, logistic, and supply chain management employees
  - 16.04 Apply sound decision-making strategies
- 17.0 Demonstrate an understanding of risk management--The student will be able to:
- 17.01 Explain types of risk
  - 17.02 Explain risk management
  - 17.03 Analyze safety/security risks
- 18.0 Demonstrate an understanding of project and quality management--The student will be able to:
- 18.01 Plan and coordinate the diverse components of a project
  - 18.02 Assess and manage a project
  - 18.03 Build interpersonal skills with individuals and teams
  - 18.04 Explain quality assurance
  - 18.05 Select and employ quality tools
  - 18.06 Examine quality cost implications
- 19.0 Demonstrate an understanding of business law, ethics and legal issues--The student will be able to:
- 19.01 Review and discuss current legal and ethical considerations as they relate to procurement, acquisition, logistics, and supply chain management
  - 19.02 Evaluate policies for managing privacy and ethical issues
- 23.0 Demonstrate an understanding of writing documentation--The student will be able to:
- 23.01 Assess report writing requirements
  - 23.02 Write reports
- 24.0 Demonstrate an understanding of information technology applications--The student will be able to:
- 24.01 Explain the concepts and use of various information technologies in logistics
  - 24.02 Describe the impact of technology on society
  - 24.03 Describe types of business software
  - 24.04 Describe Internet-based business



- 24.05 Select and apply information technology application for procurement, acquisition, logistics, and supply chain management
- 24.06 Access the Internet
- 24.07 Utilize Internet services
  
- 25.0 Demonstrate an understanding of knowledge-management--The student will be able to:
  - 25.01 Explore knowledge-management
  - 25.02 Analyze importance of capture and transfer of strategic knowledge
  - 25.03 Analyze organizational culture and the role of knowledge-management
  - 25.04 Determine barriers that affect knowledge-management implementation
  - 25.05 Evaluate various knowledge-management measurement approaches
  - 25.06 Measure intellectual capital

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Collision Repair and Refinishing  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	8709000	I470603
CIP Number	0647060300	0647060300
Grade Level	9-12, 30, 31	30, 31
Standard Length	9 credits	1400 Hours
Teacher Certification	AUTO IND @7G AUTO BODY @7G	AUTO IND @7G AUTO BODY @7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3021	49-3021
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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 basic trade skills; refinishing skills; sheetmetal repair skills; frame and unibody squaring and aligning; use of fillers; paint systems and undercoats; related welding skills; related mechanical skills; trim-hardware maintenance; glass servicing; and other miscellaneous repairs. The course content should also include training in

communication, leadership, human relations and employability skills; and safe, efficient work practices.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

### Program Structure

This program is a planned sequence of instruction consisting of five OCP's.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ARR0210	Paint and Body Helper	250	49-3021
	ARR0213	Paint and Body Assistant	250	49-3021
B	ARR0020	Auto Collision Estimator	100	49-3021
C	ARR0313	Frame and Body Repairman	150	49-3021
D	ARR0127	Automotive Refinishing	325	49-3021
E	ARR0240	Automobile Body Repairer	325	49-3021

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8709010	Automotive Collision Repair and Refinishing 1	1 credit	49-3021	2
	8709020	Automotive Collision Repair and Refinishing 2	1 credit	49-3021	2
	8709030	Automotive Collision Repair and Refinishing 3	1 credit	49-3021	2
B	8709040	Automotive Collision Repair and Refinishing 4	1 credit	49-3021	2
C	8709050	Automotive Collision Repair and Refinishing 5	1 credit	49-3021	2
D	8709060	Automotive Collision Repair and Refinishing 6	1 credit	49-3021	2
	8709070	Automotive Collision Repair and Refinishing 7	1 credit	49-3021	2
E	8709080	Automotive Collision Repair and Refinishing 8	1 credit	49-3021	2
	8709090	Automotive Collision Repair and Refinishing 9	1 credit	49-3021	2

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's

accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Demonstrate vehicle and industry knowledge, business management, and shop and occupational safety skills.
- 02.0 Prepare vehicles for repair and refinishing.
- 03.0 Repair, replace and adjust outer body panels.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Demonstrate science knowledge and skills
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 07.0 Perform welding operations.
- 08.0 Prepare surfaces for refinishing.
- 09.0 Select and apply appropriate paints and finishes.
- 10.0 Demonstrate language arts knowledge and skills
- 11.0 Solve problems using critical thinking skills, creativity and innovation.
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 13.0 Use information technology tools
- 14.0 Describe the importance of professional ethics and legal responsibilities.
- 15.0 Demonstrate personal money-management concepts, procedures, and strategies
- 16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 18.0 Explain the importance of employability and entrepreneurship skills
- 19.0 Setup vehicle for measuring and pulling.
- 20.0 Inspect, measure and repair unibody vehicles.
- 21.0 Inspect and repair frame type vehicle bodies.
- 22.0 Maintain and operate spray equipment.
- 23.0 Finish defects, causes and cures.
- 24.0 Prepare metal parts and panels for finishing.
- 25.0 Prepare and apply body fillers.
- 26.0 Perform miscellaneous repairs.
- 27.0 Repair fiberglass and plastic components.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Collision Repair and Refinishing**  
**PSAV Number: I470603**

**Course Number: ARR0210**

**Paint And Body Helper – 250 Hours – SOC Code 49-3021**

01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:

- 01.01 Comply with safety rules established by OSHA, NIOSH, EPA, and DER regarding chemicals and hazardous materials.
- 01.02 Comply with safety rules established by OSHA and NIOSH regarding personal clothing and devices.
- 01.03 Comply with safety rules regarding hand tools and power equipment and use them properly, including fire extinguishers.
- 01.04 Comply with locally developed shop safety rules and regulations.
- 01.05 Identify sources of airborne contamination and other hazards.
- 01.06 Select proper spray mask; inspect the spray mask to insure proper fit and operation; inspect the condition of the mask filters and other components.
- 01.07 Explain the "Right to Know Law" as applicable to auto body repair occupations.
- 01.08 Identify vehicle parts by name, location and function.
- 01.09 Read and explain damage reports.

02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:

- 02.01 Remove, replace and align damaged outside trim and moldings.
- 02.02 Remove, replace and align damaged or necessary inside trim and moldings.
- 02.03 Remove, replace and align damaged, non-structural body panels and components that may interfere with or be damaged during repair.
- 02.04 Protect panels and parts adjacent to repair area to prevent damage.
- 02.05 Remove dirt, grease and wax from those areas to be repaired.
- 02.06 Remove dirt, corrosion, under coatings, sealers, and/or other protective coatings necessary to perform repairs to structural areas.
- 02.07 Remove, replace, and align repairable plastics and other parts that are recommended for off-car repair.
- 02.08 Locate, read and interpret automobile manufacturers' data plates.

03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.01 Remove, replace and adjust a bolted panel or panel assembly.
- 03.02 Remove, replace and align hoods, hood hinges and hood latches.
- 03.03 Remove, replace and align deck lids, lid hinges and lid latches.
- 03.04 Remove, replace and align doors, tailgates, and hatches, lift gates and hinges.
- 03.05 Remove and replace bumpers, reinforcements, guards, isolators, and mounting hardware (release pressure from gas- and oil-filled energy-absorbing-type bumper isolators that are being discarded).

- 03.06 Check door hinge condition, replace hinge pins and bushings as needed, check door frames, check and adjust door clearances (where adjustable) along quarter panels, doors, rocker panels, fenders and tops.
- 03.07 Check and adjust latch assemblies on all hinged components.
- 04.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
  - 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 04.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 04.03 Construct charts/tables/graphs using functions and data. AF3.5
- 05.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
  - 05.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 05.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
  - 06.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 06.02 Locate, organize and reference written information from various sources. CM 3.0
  - 06.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 06.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 06.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 06.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 06.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: ARR0213**

**Occupational Completion Point: A**

**Paint and Body Assistant – 250 Hours – SOC Code 49-3021**

- 07.0 Perform Welding Operations--The student will be able to:
  - 07.01 Demonstrate welding safety procedures.
- 08.0 Prepare Surfaces For Refinishing--The student will be able to:
  - 08.01 Inspect and identify types of finishes and surface conditions and develop a plan for refinishing using one paint system from start to finish in conformance with paint system manufacturer specifications.
  - 08.02 Gain access to, remove and store trim and molding.
  - 08.03 Remove dirt, wax and road grime from areas to be refinished and adjacent surfaces including complete washing of the vehicle.
  - 08.04 Mask and protect other areas that will not be refinished.



- 08.05 Mix primer, primer surfacer or primer sealer and spray onto the surface of repaired areas including two components and self-etching primers.
  - 08.06 Apply glazing putty to minor surface imperfections.
  - 08.07 Select proper abrasives and dry or wet sand area to which primer-surfacer and glazing putty have been applied.
  - 08.08 Compound around the edges of repaired areas to be refinished.
  - 08.09 Remove dust from areas to be refinished including cracks or moldings of adjacent areas.
  - 08.10 Clean area to be refinished with a proper solution.
  - 08.11 Remove, with a tack rag, any dust or lint particles from the areas to be refinished.
- 09.0 Select And Apply Appropriate Paints And Finishes--The student will be able to:
- 09.01 Sand, buff and polish finishes.
  - 09.02 Clean and detail a vehicle after completion of refinishing.
- 10.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 10.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 10.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 10.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 11.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 11.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 11.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 11.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 11.04 Conduct technical research to gather information necessary for decision-making.PS 4.0
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 12.02 Explain emergency procedures to follow in response to workplace accidents.
  - 12.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: ARR0020**

**Occupational Completion Point: B**

**Auto Collision Estimator – 100 Hours – SOC Code 49-3021**

- 01.0 Demonstrate Vehicle And Industry Knowledge, Business Management, And Shop And Occupational Safety Skills--The student will be able to:

- 01.10 Operate basic office machines.
- 01.11 Demonstrate basic keyboarding skills and computer usage.

- 01.12 Determine acceptable parts to use: new, used or aftermarket.
- 01.13 Prepare damage reports manually to industry standards.
- 01.14 Prepare damage reports to industry standards using a computer.
- 02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:
  - 02.09 Use specification and crash manuals including "P" pages.
- 13.0 Use information technology tools. -- The students will be able to:
  - 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 14.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
  - 14.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 14.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 15.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
  - 15.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 15.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 15.03 Develop a personal budget and financial goals. FL3.1
  - 15.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 15.05 Maintain financial records. FL3.3
  - 15.06 Read and reconcile financial statements. FL3.4
  - 15.07 Research, compare and contrast investment opportunities.

**Course Number: ARR0313**  
**Occupational Completion Point: C**  
**Frame and Body Repairman – 150 Hours – SOC Code 49-3021**

- 01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:
  - 01.15 Perform structural damage analysis and determine repair procedures.
- 03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.08 Determine the extent of damage to structural body panels; repair, weld, or replace in accordance with manufacturers' specifications.
- 19.0 Setup Vehicle For Measuring And Pulling--The student will be able to:
  - 19.01 Determine and plan methods and order of repair.
  - 19.02 Mount vehicle on anchoring equipment.
  - 19.03 Measure vehicle damage using manufacturers' specifications.
  - 19.04 Attach pulling equipment, pull and re-measure.
- 20.0 Inspect, Measure And Repair Unibody Vehicles--The student will be able to:
  - 20.01 Precisely measure unibody vehicles.
  - 20.02 Diagnose and measure unibody damage using self-centering and tram gauges.
  - 20.03 Diagnose and measure unibody damage using a datum plane.
  - 20.04 Determine the location of all suspension, steering and power train component attaching point to the body.
  - 20.05 Clean, prime and apply protective coat to repaired unibody structural areas.
  - 20.06 Determine the extent of the direct and indirect damage and the direction of impact and plan the method and order of repair.
  - 20.07 Precisely measure unibody vehicles, check and adjust suspension mount points that effect four-wheel alignment.
  - 20.08 Diagnose and measure unibody damage using a dedicated (fixture) measuring system.
  - 20.09 Diagnose and measure unibody damage using a universal measuring system or a laser.
  - 20.10 Attach proper body anchoring devices.
  - 20.11 Identify procedures to straighten and align cowl assemblies.
  - 20.12 Identify procedures to straighten and align roof pillars and roof panels.
  - 20.13 Identify procedures to straighten and align doorposts, sills, floor pans and rocker panels.
  - 20.14 Identify procedures to straighten and align quarter panels, wheel-housing assemblies and rear body sections (including rail, suspension and power train panels).
  - 20.15 Identify procedures to straighten/align front-end sections (aprons, strut towers, upper/lower rails, steering, suspension and power train mounting points).
  - 20.16 Recognize the limitations of applying heat to high strength steel structural components, use proper heat stress relief methods on high strength steel and weld in accordance with manufacturers' specifications.
  - 20.17 Use proper cold stress relief methods.
  - 20.18 Remove folds, curves, creases and dents using power tools and hand tools to restore damaged areas to proper contours and dimensions.
  - 20.19 Determine the extent of damage to structural steel body panels and repair, weld or replace them in accordance with manufacturers' specifications.
  - 20.20 Determine the extent of damage to structural aluminum body panels in accordance with manufacturers' specifications.
  - 20.21 Cut out damaged sections of structural steel body panels and weld in new and/or used replacement in accordance with accepted industry standards.
  - 20.22 Recheck panel contour and alignment after pulling and correct or adjust as necessary.

- 21.0 Inspect And Repair Frame Type Vehicle Bodies--The student will be able to:
- 21.01 Diagnose and measure frame damage using self-centering and tram gauge.
  - 21.02 Determine the extent of direct and indirect damage and the direction of impact and plan methods and order of repairs.
  - 21.03 Clean, prime and protective coat repaired frame areas.
  - 21.04 Identify procedures to straighten and align mash damage.
  - 21.05 Identify procedures to straighten and align sag damage.
  - 21.06 Identify procedures to straighten and align side sway damage.
  - 21.07 Identify procedures to straighten and align twist damage.
  - 21.08 Identify procedures to straighten and align kickup damage.
  - 21.09 Identify procedures to straighten and align broadside damage.
  - 21.10 Identify procedures to straighten and align diamond frame damage.
  - 21.11 Identify procedures to remove and replace damaged frame horns, side rails, cross members and front or rear frame sections and weld cracks in frame members.
  - 21.12 Repair, reinforce or replace weakened frame members in accordance with vehicle manufacturers' recommendations.
- 16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 16.01 Describe the nature and types of business organizations. SY 1.0
  - 16.02 Explain the effect of key organizational systems on performance and quality.
  - 16.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 16.04 Explain the impact of the global economy on business organizations.
- 17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 17.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 17.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 17.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 17.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 18.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 18.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 18.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 18.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 18.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 18.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 18.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 18.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 18.08 Research the benefits of ongoing professional development. ECD 9.0
  - 18.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: ARR0127**

**Occupational Completion Point: D**

**Automotive Refinishing – 325 Hours – SOC Code 49-3021**

01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:

01.16 Inspect air makeup and exhaust systems (including intake filters, exhaust filters, fans and other mechanical components of the system) to insure proper filtering and ventilation.

08.0 Prepare Surfaces For Refinishing--The student will be able to:

08.12 Inspect and identify type of substrate, and surface condition; develop a plan for refinishing.

08.13 Chemically and mechanically remove paint finishes.

08.14 Dry and wet sand areas to be refinished.

08.15 Featheredge broken areas to be refinished.

08.16 Determine when sealing is needed or desirable and apply suitable sealer to the area being refinished.

08.17 Scuff sand to remove nibs or overspray from a sealer.

08.18 Apply adhesion promoter over areas to be painted and blend into adjacent areas.

08.19 Apply stone chip resistant coating.

08.20 Restore corrosion resistant coatings, caulking and seam sealers to repaired areas.

09.0 Select And Apply Appropriate Paints And Finishes--The student will be able to:

09.03 Select the proper spray mask, inspect the spray mask to insure proper fit and operation, and inspect the condition of the mask filters and other components.

09.04 Determine the type and color of paint already on a vehicle and identify alternates.

09.05 Measure, shake, stir, thin or reduce, and strain paint.

09.06 Verify color match before applying and adjust if needed.

09.07 Apply acrylic enamel for spot, panel and overall refinishing.

09.08 Apply urethane enamel for spot, panel and overall refinishing.

09.09 Apply urethane clear coat for spot, panel and overall repairs.

09.10 Apply decals, transfers, tapes, wood-grains, pinstripes (painted and taped), etc.

09.11 Properly dispose of hazardous waste.

09.12 Identify the types of plastic parts to be finished and determine the proper refinishing procedure.

09.13 Apply a finish coat to plastic parts.

09.14 Clean, condition and refinish vinyl (e.g. upholstery, dashes and tops).

09.15 Apply a tri-coat paint system.

22.0 Maintain And Operate Spray Equipment--The student will be able to:

22.01 Explain, adjust and use a variety of spray guns including siphon feed, pressure feed, gravity feed and HVLP.

22.02 Check and adjust air pressure at the spray gun.

- 22.03 Adjust spray gun fluid and pattern control valves.
- 22.04 Use appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
- 22.05 Inspect, clean and determine the condition and adequacy of spray guns and related equipment (air hoses, regulators, airlines, air sources and spray environment).
- 22.06 Maintain and properly use the spray booth.

23.0 Finish Defects; Causes And Cures--The student will be able to:

- 23.01 Check for rust spots; determine the cause(s) and correct the condition.
- 23.02 Identify paint cracking (crowsfeet or line-checking, micro checking, etc); correct the condition.
- 23.03 Identify poor adhesion; determine the cause(s) and correct the condition.
- 23.04 Identify blistering appearance in the paint surface; determine the cause(s) and correct the condition.
- 23.05 Identify water spotting on paint surface, correct the condition.
- 23.06 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
- 23.07 Identify finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); correct the condition.
- 23.08 Identify die-back conditions (dulling of the paint film showing haziness and/or film distortion showing shrinking); correct the condition.
- 23.09 Identify chalking (oxidation); correct the condition.
- 23.10 Identify body filler bleed-through; correct the condition.
- 23.11 Identify pin holing; correct the condition.

**Course Number: ARR0240**

**Occupational Completion Point: E**

**Automobile Body Repairer – 325 Hours – SOC Code 49-3021**

02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:

- 02.10 Diagnose and analyze damage to determine appropriate methods for overall repair.
- 02.11 Locate, remove and replace to specifications, those vehicle electrical/electronic devices that might be damaged during repair.
- 02.12 Explain proper air bag operation and passive restraint handling.

03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.09 Remove, replace and align a welded (non-structural) steel panel or panel assembly.
- 03.10 Straighten roughed out contours of damaged panels to a surface condition for body filling or metal finishing.
- 03.11 Weld cracked or torn steel body panels; reweld broken welds.
- 03.12 Apply protective coatings and sealants to structural panels.
- 03.13 Heat shrink stretched panel areas back to contour.
- 03.14 Cold shrink stretched panel areas back to contour.
- 03.15 Repair or replace door skins and intrusion beams.

07.0 Perform Welding Operations--The student will be able to:

- 07.02 Identify metal types prior to welding.
- 07.03 Setup, operate and maintain metal inert gas (MIG) welding equipment.
- 07.04 Perform various welds with MIG equipment including plug, butt and lap.
- 07.05 Setup and maintain oxyacetylene welding equipment.
- 07.06 Explain various welding, cutting and heating techniques with oxyacetylene equipment.
- 07.07 Describe plasma cutting.
- 07.08 Remove, replace and align damaged, structural body panels and components that may interfere with or be damaged during repairing.
- 07.09 Identify procedures to Weld aluminum.
- 07.10 Explain electric compression spot welding.
- 07.11 Set up and perform plasma-cutting operations.

24.0 Prepare Metal Parts And Panels For Finishing--The student will be able to:

- 24.01 Identify specification(s) of metals used in automobiles.
- 24.02 Identify heat effects on metals.
- 24.03 Identify the importance of maintaining the structural integrity of an vehicle body.
- 24.04 Remove the paint from the damaged area of a body panel.
- 24.05 Pick and file the damaged area of a body panel to eliminate surface irregularities.
- 24.06 Disc sand the repaired body panel to produce final smoothness.

25.0 Prepare And Apply Body Fillers--The student will be able to:

- 25.01 Mix plastic filler.
- 25.02 Apply plastic body filler and cheese grate during curing.
- 25.03 Block sand cured plastic body fillers to contour and then finish sand.

26.0 Perform Miscellaneous Repairs--The student will be able to:

- 26.01 Align headlamps.
- 26.02 Apply rust repair methods including grinding, sandblasting and metal preparation.
- 26.03 Remove and replace headliners, carpets, seats and other interior components and trim.
- 26.04 Inspect, repair or replace weather stripping.
- 26.05 Identify procedures to perform two- and four- wheel alignments.
- 26.06 Diagnose and repair water leaks, dust leaks and wind noises.
- 26.07 Identify procedures to remove and replace all stationary glass (including windshield, back lights, etc.) using manufacturers' recommended installation materials and procedures including electrically heated glass.
- 26.08 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanism and related controls.
- 26.09 Repair/replace all power driven accessories and related controls.
- 26.10 Inspect, repair or replace and adjust removable manually operated or electrically operated roof panels, hinges, latches, guides, handles, retainers and controls of sunroof.
- 26.11 Diagnose and repair damaged circuits, wires and electrical components.
- 26.12 Remove, replace and cap off air conditioner components.
- 26.13 Evacuate, recycle and recharge air conditioning systems.

- 26.14 Identify procedures to remove and replace engines and mounts.
- 26.15 Identify procedures to remove and replace transmissions and mounts.
- 26.16 Identify procedures to remove and replace suspension parts.
- 26.17 Identify procedures to remove and replace brake parts.
- 26.18 Identify procedures to bleed brakes.
- 26.19 Identify procedures to remove and replace fuel system components.
- 26.20 Demonstrate an understanding of ABS braking systems.
- 26.21 Inspect, adjust or repair steering, suspension and power-train components that affect four-wheel alignment.

27.0 Repair Fiberglass And Plastic Components--The student will be able to:

- 27.01 Differentiate between fiberglass and sheet molded compound (SMC) to be repaired and the appropriate repair procedures (including plastic welding, chemical bonding and the use of structural adhesives).
- 27.02 Repair deep gouges and cracks in fiberglass panels and sheet molded compound (SMC).
- 27.03 Repair holes in fiberglass panels and SMC.
- 27.04 Repair fiberglass body panels and straighten/align panel supports.
- 27.05 Remove damaged areas from fiberglass panels and SMC and repair with partial panel installation.
- 27.06 Prepare the surfaces of and repair damage to, thermoplastic parts.
- 27.07 Prepare the surfaces of and repair damage to thermosetting-plastic parts.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 1  
**Course Number:** 8709010  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for demonstrating shop and occupational safety skills and employability skills, and comprehending and complying with requirements concerning legal liability and consequent insurance implications.

- 01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:
- 01.01 Comply with safety rules established by OSHA, NIOSH, EPA, and DER regarding chemicals and hazardous materials.
  - 01.02 Comply with safety rules established by OSHA and NIOSH regarding personal clothing and devices.
  - 01.03 Comply with safety rules regarding hand tools and power equipment and use them properly, including fire extinguishers.
  - 01.04 Comply with locally developed shop safety rules and regulations.
  - 01.05 Identify sources of airborne contamination and other hazards.
  - 01.06 Select proper spray mask; inspect the spray mask to insure proper fit and operation; inspect the condition of the mask filters and other components.
  - 01.07 Explain the "Right to Know Law" as applicable to auto body repair occupations.
  - 01.08 Identify vehicle parts by name, location and function.
  - 01.09 Read and explain damage reports.
- 02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:
- 02.01 Remove, replace and align damaged outside trim and moldings.
  - 02.02 Remove, replace and align damaged or necessary inside trim and moldings.
  - 02.03 Remove, replace and align damaged, non-structural body panels and components that may interfere with or be damaged during repair.
  - 02.04 Protect panels and parts adjacent to repair area to prevent damage.
  - 02.05 Remove dirt, grease and wax from those areas to be repaired.
  - 02.06 Remove dirt, corrosion, under coatings, sealers, and/or other protective coatings necessary to perform repairs to structural areas.
  - 02.07 Remove, replace, and align repairable plastics and other parts that are recommended for off-car repair.
  - 02.08 Locate, read and interpret automobile manufacturers' data plates.
- 04.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 04.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4

- 04.03 Construct charts/tables/graphs using functions and data. AF3.5
- 05.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 05.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 05.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 06.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 06.02 Locate, organize and reference written information from various sources. CM 3.0
- 06.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 06.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 06.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 06.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 06.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 2  
**Course Number:** 8709020  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for preparing vehicles for repair and refinishing and repair, replacement and adjustment of outer body panels.

03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.01 Remove, replace and adjust a bolted panel or panel assembly.
- 03.02 Remove, replace and align hoods, hood hinges and hood latches.
- 03.03 Remove, replace and align deck lids, lid hinges and lid latches.
- 03.04 Remove, replace and align doors, tailgates, hatches, lift gates and hinges.
- 03.05 Remove and replace bumpers, reinforcements, guards, isolators, and mounting hardware (release pressure from gas- and oil-filled energy-absorbing-type bumper isolators that are being discarded).
- 03.06 Check door hinge condition, replace hinge pins and bushings as needed, check door frames, check and adjust door clearances (where adjustable) along quarter panels, doors, rocker panels, fenders and tops.
- 03.07 Check and adjust latch assemblies on all hinged components.

04.0 Perform Welding Operations--The student will be able to:

- 04.01 Demonstrate welding safety procedures.

05.0 Prepare Surfaces For Refinishing--The student will be able to:

- 05.01 Inspect and identify types of finishes and surface conditions and develop a plan for refinishing using one paint system from start to finish in conformance with paint system manufacturer specifications.
- 05.02 Gain access to, remove and store trim and molding.
- 05.03 Remove dirt, wax and road grime from areas to be refinished and adjacent surfaces including complete washing of the vehicle.
- 05.04 Mask and protect other areas that will not be refinished.
- 05.05 Mix primer, primer surfacer or primer sealer and spray onto the surface of repaired areas including two components and self-etching primers.
- 05.06 Apply glazing putty to minor surface imperfections.
- 05.07 Select proper abrasives and dry or wet sand area to which primer-surfacer and glazing putty have been applied.
- 05.08 Compound around the edges of repaired areas to be refinished.
- 05.09 Remove dust from areas to be refinished including cracks or moldings of adjacent areas.
- 05.10 Clean area to be refinished with a proper solution.

- 05.11 Remove, with a tack rag, any dust or lint particles from the areas to be refinished.
- 10.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 10.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 10.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 10.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 11.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 11.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 11.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 11.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 11.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 12.02 Explain emergency procedures to follow in response to workplace accidents.
- 12.03 Create a disaster and/or emergency response plan. SHE 2.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 3  
**Course Number:** 8709030  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for applying appropriate paints and finishes and a understanding of entrepreneurship.

06.0 Select And Apply Appropriate Paints And Finishes--The student will be able to:

- 06.01 Sand, buff and polish finishes.
- 06.02 Clean and detail a vehicle after completion of refinishing.

13.0 Use information technology tools. -- The students will be able to:

- 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

14.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 14.04 Interpret and explain written organizational policies and procedures. ELR 2.0

15.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- 15.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 15.02 Describe the effect of money management on personal and career goals. FL 3.0
- 15.03 Develop a personal budget and financial goals. FL3.1
- 15.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 15.05 Maintain financial records. FL3.3
- 15.06 Read and reconcile financial statements. FL3.4
- 15.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 4  
**Course Number:** 8709040  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in procedures for occupational safety skills and prepare vehicles for repair.

01.0 Demonstrate Vehicle And Industry Knowledge, Business Management, And Shop And Occupational Safety Skills--The student will be able to:

- 01.10 Operate basic office machines.
- 01.11 Demonstrate basic keyboarding skills and computer usage.
- 01.12 Determine acceptable parts to use new, used or aftermarket.
- 01.13 Prepare damage reports manually to industry standards.
- 01.14 Prepare damage reports to industry standards using a computer.

02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:

- 02.09 Use specification and crash manuals including "P" pages.

16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 16.01 Describe the nature and types of business organizations. SY 1.0
- 16.02 Explain the effect of key organizational systems on performance and quality.
- 16.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 16.04 Explain the impact of the global economy on business organizations.

17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 17.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 17.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 17.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 17.04 Employ mentoring skills to inspire and teach others. LT 5.0

18.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 18.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 18.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 18.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0

- 18.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 18.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 18.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 18.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 18.08 Research the benefits of ongoing professional development. ECD 9.0
- 18.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 5  
**Course Number:** 8709050  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for structural damage analysis and the repair of vehicle structure.

- 01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:
- 01.15 Perform structural damage analysis and determine repair procedures.
- 03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:
- 03.08 Determine the extent of damage to structural body panels; repair, weld, or replace in accordance with manufacturers' specifications.
- 19.0 Setup Vehicle For Measuring And Pulling--The student will be able to:
- 19.01 Determine and plan methods and order of repair.
  - 19.02 Mount vehicle on anchoring equipment.
  - 19.03 Measure vehicle damage using manufacturers' specifications.
  - 19.04 Attach pulling equipment, pull and re-measure.
- 20.0 Inspect, Measure And Repair Unibody Vehicles--The student will be able to:
- 20.01 Precisely measure unibody vehicles.
  - 20.02 Diagnose and measure unibody damage using self-centering and tram gauges.
  - 20.03 Diagnose and measure unibody damage using a datum plane.
  - 20.04 Determine the location of all suspension, steering and power train component attaching point to the body.
  - 20.05 Clean, prime and apply protective coat to repaired unibody structural areas.
  - 20.06 Determine the extent of the direct and indirect damage and the direction of impact and plan the method and order of repair.
  - 20.07 Precisely measure unibody vehicles, check and adjust suspension mount points that effect four-wheel alignment.
  - 20.08 Diagnose and measure unibody damage using a dedicated (fixture) measuring system.
  - 20.09 Diagnose and measure unibody damage using a universal measuring system or a laser.
  - 20.10 Attach proper body anchoring devices.
  - 20.11 Identify procedures to straighten and align cowl assemblies.
  - 20.12 Identify procedures to straighten and align roof pillars and roof panels.



- 20.13 Identify procedures to straighten and align doorposts, sills, floor pans and rocker panels.
- 20.14 Identify procedures to straighten and align quarter panels, wheel-housing assemblies and rear body sections (including rail, suspension and power train panels).
- 20.15 Identify procedures to straighten/align front end sections (aprons, strut towers, upper/lower rails, steering, suspension and power train mounting points).
- 20.16 Recognize the limitations of applying heat to high strength steel structural components, use proper heat stress relief methods on high strength steel and weld in accordance with manufacturers' specifications.
- 20.17 Use proper cold stress relief methods.
- 20.18 Remove folds, curves, creases and dents using power tools and hand tools to restore damaged areas to proper contours and dimensions.
- 20.19 Determine the extent of damage to structural steel body panels and repair, weld or replace them in accordance with manufacturers' specifications.
- 20.20 Determine the extent of damage to structural aluminum body panels in accordance with manufacturers' specifications.
- 20.21 Cut out damaged sections of structural steel body panels and weld in new and/or used replacement in accordance with accepted industry standards.
- 20.22 Recheck panel contour and alignment after pulling and correct or adjust as necessary.

21.0 Inspect And Repair Frame Type Vehicle Bodies--The student will be able to:

- 21.01 Diagnose and measure frame damage using self centering and tram gauge.
- 21.02 Determine the extent of direct and indirect damage and the direction of impact and plan methods and order of repairs.
- 21.03 Clean, prime and protective coat repaired frame areas.
- 21.04 Identify procedures to straighten and align mash damage.
- 21.05 Identify procedures to straighten and align sag damage.
- 21.06 Identify procedures to straighten and align side sway damage.
- 21.07 Identify procedures to straighten and align twist damage.
- 21.08 Identify procedures to straighten and align kickup damage.
- 21.09 Identify procedures to straighten and align broadside damage.
- 21.10 Identify procedures to straighten and align diamond frame damage.
- 21.11 Identify procedures to remove and replace damaged frame horns, side rails, cross members and front or rear frame sections and weld cracks in frame members.
- 21.12 Repair, reinforce or replace weakened frame members in accordance with vehicle manufacturers' recommendations.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 6  
**Course Number:** 8709060  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for inspecting spray equipment and selection and application of finishes.

01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:

01.16 Inspect air makeup and exhaust systems (including intake filters, exhaust filters, fans and other mechanical components of the system) to insure proper filtering and ventilation.

08.0 Prepare Surfaces For Refinishing--The student will be able to:

08.15 Inspect and identify type of substrate, and surface condition; develop a plan for refinishing.

08.16 Chemically and mechanically remove paint finishes.

08.17 Dry and wet sand areas to be refinished.

08.18 Featheredge broken areas to be refinished.

08.19 Determine when sealing is needed or desirable and apply suitable sealer to the area being refinished.

08.20 Scuff sand to remove nibs or overspray from a sealer.

08.21 Apply adhesion promoter over areas to be painted and blend into adjacent areas.

08.22 Apply stone chip resistant coating.

08.23 Restore corrosion resistant coatings, caulking and seam sealers to repaired areas.

09.0 Select And Apply Appropriate Paints And Finishes--The student will be able to:

09.03 Select the proper spray mask, inspect the spray mask to insure proper fit and operation, and inspect the condition of the mask filters and other components.

09.04 Determine the type and color of paint already on a vehicle and identify alternates.

09.05 Measure, shake, stir, thin or reduce, and strain paint.

09.06 Verify color match before applying and adjust if needed.

09.07 Apply acrylic enamel for spot, panel and overall refinishing.

09.08 Apply urethane enamel for spot, panel and overall refinishing.

09.09 Apply urethane clear coat for spot, panel and overall repairs.

09.10 Apply decals, transfers, tapes, wood-grains, pinstripes (painted and taped), etc.

09.11 Properly dispose of hazardous waste.

09.12 Identify the types of plastic parts to be finished and determine the proper refinishing procedure.

09.13 Apply a finish coat to plastic parts.

- 09.14 Clean, condition and refinish vinyl (e.g. upholstery, dashes and tops).
- 09.15 Apply a tri-coat paint system.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 7  
**Course Number:** 8709070  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for maintaining spray equipment and the causes of finish defects.

22.0 Maintain And Operate Spray Equipment--The student will be able to:

- 22.01 Explain, adjust and use a variety of spray guns including siphon feed, pressure feed, gravity feed and HVLP.
- 22.02 Check and adjust air pressure at the spray gun.
- 22.03 Adjust spray gun fluid and pattern control valves.
- 22.04 Use appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
- 22.05 Inspect, clean and determine the condition and adequacy of spray guns and related equipment (air hoses, regulators, air lines, air sources and spray environment).
- 22.06 Maintain and properly use the spray booth.

23.0 Finish Defects: Causes And Cures--The student will be able to:

- 23.01 Check for rust spots; determine the cause(s) and correct the condition.
- 23.02 Identify paint cracking (crowsfeet or line-checking, micro-checking, etc); correct the condition.
- 23.03 Identify poor adhesion; determine the cause(s) and correct the condition.
- 23.04 Identify blistering appearance in the paint surface; determine the cause(s) and correct the condition.
- 23.05 Identify water spotting on paint surface, correct the condition.
- 23.06 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
- 23.07 Identify finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); correct the condition.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 8  
**Course Number:** 8709080  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for adjustment of outer body panels and welding operations.

23.0 Finish Defects; Causes And Cures--The student will be able to:

- 23.08 Identify die-back conditions (dulling of the paint film showing haziness and/or film distortion showing shrinking); correct the condition.
- 23.09 Identify chalking (oxidation); correct the condition.
- 23.10 Identify body filler bleed-through; correct the condition.
- 23.11 Identify pin-holing; correct the condition.

02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:

- 02.10 Diagnose and analyze damage to determine appropriate methods for overall repair.
- 02.11 Locate, remove and replace to specifications, those vehicle electrical/electronic devices that might be damaged during repair.
- 02.12 Explain proper air bag operation and passive restraint handling.

03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.09 Remove, replace and align a welded (non-structural) steel panel or panel assembly.
- 03.10 Straighten roughed out contours of damaged panels to a surface condition for body filling or metal finishing.
- 03.11 Weld cracked or torn steel body panels; reweld broken welds.
- 03.12 Apply protective coatings and sealants to structural panels.
- 03.13 Heat shrink stretched panel areas back to contour.
- 03.14 Cold shrink stretched panel areas back to contour.
- 03.15 Repair or replace door skins and intrusion beams.

07.0 Perform Welding Operations--The student will be able to:

- 07.02 Identify metal types prior to welding.
- 07.03 Setup, operate and maintain metal inert gas (MIG) welding equipment.
- 07.04 Perform various welds with MIG equipment including plug, butt and lap.
- 07.05 Setup and maintain oxyacetylene welding equipment.
- 07.06 Explain various welding, cutting and heating techniques with oxyacetylene equipment.
- 07.07 Describe plasma cutting.

- 07.08 Remove, replace and align damaged, structural body panels and components that may interfere with or be damaged during repairing.
- 07.09 Identify procedures to Weld aluminum.
- 07.10 Explain electric compression spot welding.
- 07.11 Set up and perform plasma cutting operations.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Collision Repair and Refinishing 9  
**Course Number:** 8709090  
**Course Credit:** 1

**Course Description:**

This course is designed to provide instruction in the different procedures for applying body fillers and performing miscellaneous repairs.

24.0 Prepare Metal Parts And Panels For Finishing--The student will be able to:

- 24.01 Identify specification(s) of metals used in automobiles.
- 24.02 Identify heat effects on metals.
- 24.03 Identify the importance of maintaining the structural integrity of an vehicle body.
- 24.04 Remove the paint from the damaged area of a body panel.
- 24.05 Pick and file the damaged area of a body panel to eliminate surface irregularities.
- 24.06 Disc sand the repaired body panel to produce final smoothness.

25.0 Prepare And Apply Body Fillers--The student will be able to:

- 25.01 Mix plastic filler.
- 25.02 Apply plastic body filler and cheese grate during curing.
- 25.03 Block sand cured plastic body fillers to contour and then finish sand.

26.0 Perform Miscellaneous Repairs--The student will be able to:

- 26.01 Align headlamps.
- 26.02 Apply rust repair methods including grinding, sandblasting and metal preparation.
- 26.03 Remove and replace headliners, carpets, seats and other interior components and trim.
- 26.04 Inspect, repair or replace weather stripping.
- 26.05 Identify procedures to perform two- and four- wheel alignments.
- 26.06 Diagnose and repair water leaks, dust leaks and wind noises.
- 26.07 Identify procedures to remove and replace all stationary glass (including windshield, back lights, etc.) using manufacturers' recommended installation materials and procedures including electrically heated glass.
- 26.08 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanism and related controls.
- 26.09 Repair/replace all power driven accessories and related controls.
- 26.10 Inspect, repair or replace and adjust removable manually operated or electrically operated roof panels, hinges, latches, guides, handles, retainers and controls of sun roof.
- 26.11 Diagnose and repair damaged circuits, wires and electrical components.
- 26.12 Remove, replace and cap off air conditioner components.
- 26.13 Evacuate, recycle and recharge air conditioning systems.
- 26.14 Identify procedures to remove and replace engines and mounts.

- 26.15 Identify procedures to remove and replace transmissions and mounts.
- 26.16 Identify procedures to remove and replace suspension parts.
- 26.17 Identify procedures to remove and replace brake parts.
- 26.18 Identify procedures to bleed brakes.
- 26.19 Identify procedures to remove and replace fuel system components.
- 26.20 Demonstrate an understanding of ABS braking systems.
- 26.21 Inspect, adjust or repair steering, suspension and power-train components that affect four-wheel alignment.

27.0 Repair Fiber Glass And Plastic Components--The student will be able to:

- 27.01 Differentiate between fiberglass and sheet molded compound (SMC) to be repaired and the appropriate repair procedures (including plastic welding, chemical bonding and the use of structural adhesives).
- 27.02 Repair deep gouges and cracks in fiberglass panels and sheet molded compound (SMC).
- 27.03 Repair holes in fiberglass panels and SMC.
- 27.04 Repair fiberglass body panels and straighten/align panel supports.
- 27.05 Remove damaged areas from fiberglass panels and SMC and repair with partial panel installation.
- 27.06 Prepare the surfaces of and repair damage to, thermoplastic parts.
- 27.07 Prepare the surfaces of and repair damage to thermosetting-plastic parts.



2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Service Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>Secondary</b>	<b>PSAV</b>
Program Number	8709400	I470608
CIP Number	0647060405	0647060405
Grade Level	9-12, 30, 31	30, 31
Standard Length	12 Credits	1800 Hours
Teacher Certification	AUTO IND @7 G AUTO MECH @7 G	AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3023	49-3023
Facility Code	246 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 10.0 Language: 9.0 Reading: 9.0

### **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 broad, transferable skills and stresses understanding and demonstration of the following elements of the automotive industry;

planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### Program Structure

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

**NOTE: The sequence of OCP's, after completing the core OCP A, is at the discretion of the instructor. It should be noted that NATEF requires a minimum certification in four occupational areas (Brakes, Electrical/Electronics, Engine Performance and Suspension/Steering) for program certification. Florida Statute (F.S.) 1004.925 requires Automotive Service Technology programs to be industry certified by 2007**

Competencies established by the Automotive Industries for "INDUSTRY TRAINING STANDARDS" plus integration of academic requirements and training in communications, leadership, human relations, employability skills, safe, efficient work practices and entrepreneurship account for 300 hours in the CORE curriculum (OCP A).

All the tasks that are assigned a priority number: P-1, P-2, or P-3 are National Automotive Technician Education Foundation Tasks. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the Policies section for additional information on the requirements for instruction on tasks.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0014	Automobile Services Assistor	300	49-3023
B	AER0110	Engine Repair Technician	150	49-3023
C	AER0257	Automatic Transmission and Transaxle Technician	150	49-3023
D	AER0274	Manual Drivetrain and Axle Technician	150	49-3023
E	AER0453	Automobile Suspension and Steering Technician	150	49-3023
F	AER0418	Automotive Brake System Technician	150	49-3023
G	AER0360	Automotive Electrical/Electronic System Technician	300	49-3023
H	AER0172	Automotive Heating and Air Conditioning Technician	150	49-3023
I	AER0503	Automotive Engine Performance Technician	300	49-3023

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Title	Level
	8709410	Automotive Service Technology 1	1 credit	49-3023	2
A	8709420	Automotive Service Technology 2	1 credit	49-3023	2
B	8709430	Automotive Service Technology 3	1 credit	49-3023	2
C	8709440	Automotive Service Technology 4	1 credit	49-3023	2
D	8709450	Automotive Service Technology 5	1 credit	49-3023	2

E	8709460	Automotive Service Technology 6	1 credit	49-3023	2
F	8709470	Automotive Service Technology 7	1 credit	49-3023	3
G	8709480	Automotive Service Technology 8	1 credit	49-3023	3
	8709490	Automotive Service Technology 9	1 credit	49-3023	3
H	8709491	Automotive Service Technology 10	1 credit	49-3023	3
I	8709492	Automotive Service Technology 11	1 credit	49-3023	3
	8709493	Automotive Service Technology 12	1 credit	49-3023	3

1.0 It is assumed that:

- 1.a In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
- 1.b The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
- 1.c The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.

2.0 It is assumed that:

- 2.a All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published.  
For every task listed, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of hazardous materials in accordance with local, state, and federal safety and environmental regulations.

3.0 It is assumed that:

- 3.a Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
- 3.b Learning progress of students will be monitored and evaluated against these performance standards;
- 3.c A system is in place, which informs all students of their individual progress through all phases of the training program.

4.0 It is assumed that:

- 4.a Individual courses of study will differ across automobile technician training programs;
- 4.b Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.

5.0 It is assumed that:

- 5.a All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law".
- 5.b Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills

Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.).

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program (I470608) has a statewide articulation agreement approved by the Articulation Coordinating Committee:

Automotive Service Management Technology (AS 1615080300 / AAS 0615080300) – 19 Credit Hours

Automobile/Light Truck Certifications A1 – A8, awarded by the National Institute for Automotive Service Excellence (ASE), articulate three (3) credits each to the Automotive Service Management Technology (AS 1615080300 / AAS 0615080300) degree.

For details on articulation agreements which correlate to programs and industry certifications refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry.
- 02.0 Demonstrate proficiency in routine maintenance and consumer services.
- 03.0 Demonstrate proficiency in the operation and servicing of automotive brake systems.
- 04.0 Demonstrate proficiency in drum brake diagnosis and repair.
- 05.0 Demonstrate proficiency in the operation of disc brake diagnosis and repair.
- 06.0 Demonstrate proficiency in the operation of power assist units diagnosis and repair.
- 07.0 Demonstrate proficiency in miscellaneous (wheel bearings, parking brakes, electrical, etc.)
- 08.0 Demonstrate proficiency in antilock brake system.
- 09.0 Demonstrate proficiency in general suspension and steering systems diagnosis.
- 10.0 Demonstrate proficiency in suspension systems diagnosis and repair; front suspensions.
- 11.0 Demonstrate proficiency in suspension systems diagnosis and repair; rear suspensions, wheel alignment diagnosis, adjustment, repair and miscellaneous service.
- 12.0 Demonstrate proficiency in wheel and tire diagnosis and repair.
- 13.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train.
- 14.0 Demonstrate proficiency in battery diagnosis and service.

- 15.0 Demonstrate proficiency in starting system diagnosis and repair.
- 16.0 Demonstrate proficiency in charging system diagnosis and repair
- 17.0 Demonstrate proficiency in lighting systems, gauges, warning devices, and driver information systems diagnosis and repair
- 18.0 Demonstrate proficiency in horn and wiper/washer and accessories diagnosis and repair
- 19.0 Demonstrate proficiency in general engine diagnosis.
- 20.0 Demonstrate proficiency in computerized engine controls diagnosis and repair.
- 21.0 Demonstrate proficiency in ignition system diagnosis and repair.
- 22.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair.
- 23.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair.
- 24.0 Demonstrate proficiency in emissions controls systems
- 25.0 Demonstrate proficiency in engine related service.
- 26.0 Demonstrate proficiency in appropriate math skills.
- 27.0 Demonstrate proficiency in appropriate understanding of basic sciences.
- 28.0 Demonstrate proficiency in employability skills.
- 29.0 Demonstrate proficiency in appropriate communication skills.
- 30.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry.
- 31.0 Demonstrate proficiency in understanding of entrepreneurship.
- 32.0 Demonstrate proficiency in general engine diagnosis.
- 33.0 Demonstrate proficiency in cylinder head and valve train diagnosis and repair.
- 34.0 Demonstrate proficiency in engine block diagnosis and repair.
- 35.0 Demonstrate proficiency in lubrication and cooling systems diagnosis and repairs.
- 36.0 Demonstrate language arts knowledge and skills
- 37.0 Solve problems using critical thinking skills, creativity and innovation.
- 38.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 39.0 Demonstrate proficiency in A/C system diagnosis and repair.
- 40.0 Demonstrate proficiency in refrigeration system component diagnosis and repair of compressor, compressor clutch, evaporator, receiver/drier, condenser, etc.
- 41.0 Demonstrate proficiency in heating and engine cooling systems diagnosis and repair
- 42.0 Demonstrate proficiency in A/C operating systems and related controls diagnosis and repairs
- 43.0 Demonstrate proficiency refrigerant recovery, recycling, and handling
- 44.0 Demonstrate proficiency in general drive train diagnosis, clutch diagnosis and repair.
- 45.0 Demonstrate proficiency in transmission & transaxle diagnosis and repair.
- 46.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 47.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 48.0 Demonstrate proficiency in drive and half shaft universal and constant-velocity (CV) joint diagnosis and repair.
- 49.0 Demonstrate proficiency in rear axle diagnosis and repair; ring and pinion gears, differential case assembly and limited slip differential.
- 50.0 Demonstrate proficiency in drive axle shaft and four-wheel drive/all-wheel drive component diagnosis and repair.
- 51.0 Demonstrate proficiency in the operation, diagnosis and servicing of automatic transmission/transaxle.

- 52.0 Use information technology tools
- 53.0 Describe the importance of professional ethics and legal responsibilities.
- 54.0 Demonstrate personal money-management concepts, procedures, and strategies
- 55.0 Demonstrate proficiency in transmission/transaxle maintenance, adjustment and in-vehicle transmission/transaxle repair.
- 56.0 Demonstrate proficiency in off-vehicle transmission/transaxle repair (removal, disassembly, and reinstallation), oil pump and converter.
- 57.0 Demonstrate proficiency in gear train, shafts, bushings, case, friction units and reaction units.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Service Technology  
PSAV Number: I470608**

**Course Number: AER0014  
Occupational Completion Point: A  
Automotive Services Assistor – 300 Hours – SOC Code 49-3023**

01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry--The student will be able to:

- 01.01 Apply shop safety rules, EPA and OSHA standards.
- 01.02 Identify and use appropriate emergency first aid procedures
- 01.03 Identify, use and maintain hand and power tools properly.
- 01.04 Identify and practice using appropriate precision-measuring tools and torque methods.
- 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.
- 01.06 Identify and use Metric and English measurement skills.
- 01.07 Use computer and operate keyboard.
- 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
- 01.09 Identify and describe typical automotive lubricants and lubricant properties.
- 01.10 Interpret the Federal 'Workers Right To Know Law'.
- 01.11 Identify and describe typical automotive seals and gaskets.
- 01.12 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
- 01.13 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
- 01.14 Describe and identify supplemental restraint systems (SRS).
- 01.15 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

02.0 Demonstrate proficiency in routine maintenance and consumer services (AKA light line AKA general service technician)--The student will be able to:

- 02.01 Identify information needed for the service requested on a repair order.
- 02.02 Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.
- 02.03 Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.
- 02.04 Determine the presence of a Tire Pressure Monitoring System (TPMS).
- 02.05 Determine the presence of wheel locks.
- 02.06 Determine the presence of an air suspension system.
- 02.07 Check operation and status of instrument panel warning lights and gauges.

Locating Information

- 02.08 Locate and use the Vehicle Identification Number (VIN).
- 02.09 Locate and use vehicle information placards, decals, tags, as required.
- 02.10 Locate and use paper and electronic manuals.
- 02.11 Locate and use technical service bulletins (TSBs).
- 02.12 Locate and use material safety data sheets (MSDS).

### Tools and Equipment

- 02.13 Identify tools and equipment and their appropriate usage in automotive applications.
- 02.14 Identify standard and metric designation.
- 02.15 Identify and use proper placement of floor jacks and jack stands.
- 02.16 Identify and use proper procedures for safe lift usage.
- 02.17 Identify and use proper procedures for safe pit usage.
- 02.18 Use proper ventilation procedures for working within the shop area.
- 02.19 Use proper handling procedures for automotive fluids.
- 02.20 Use proper chemicals for cleaning and lubrication.

### Preparing Vehicle for Customer

- 02.21 Ensure vehicle is prepared to return to customer per company policy (floor mats, steering wheel cover, etc.).
- 02.22 Reset maintenance indicators.
- 02.23 Verify status of instrument panel warning lights and gauges.
- 02.24 Complete documentation on services performed.

### Underhood Inspection

- 02.25 Inspect underhood area for leaks, damage, and unusual conditions.
- 02.26 Determine fluid type requirements and identify fluid.
- 02.27 Check engine oil level and condition; service as required.
- 02.28 Check engine coolant level and condition; service as required.
- 02.29 Check power steering fluid level and condition; service as required.
- 02.30 Check brake fluid level and condition; service as required.
- 02.31 Check hydraulic clutch fluid and condition; service as required.
- 02.32 Check windshield washer fluid level and condition; service as required.
- 02.33 Check automatic transmission fluid level and condition; service as required.

### Undercar Inspection

- 02.34 Inspect undercar area for leaks, damage, and unusual conditions.
- 02.35 Check differential/transfer case fluid level; note unusual conditions; service as required.
- 02.36 Check manual transmission fluid level; note unusual conditions; service as required.
- 02.37 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear.
- 02.38 Lubricate driveline, suspension and steering systems.
- 02.39 Inspect cooling system pipes and hoses for wear, damage, and proper routing.

### Filters and Drive Belts

- 02.40 Change engine oil and filter.
- 02.41 Replace inline fuel filters as applicable.
- 02.42 Inspect and replace air filter.
- 02.43 Inspect and replace cabin air filter.
- 02.44 Inspect, replace and adjust drive belts; inspect tensioners and pulleys.
- 02.45 Document observed damage, unusual conditions, and concerns.

### Suspension Inspection

- 02.46 Visually inspect struts, springs, and related components.
- 02.47 Visually inspect stabilizer bar, bushings, brackets, and links.
- 02.48 Visually inspect springs, torsion bars, and related components.
- 02.49 Visually inspect shock absorbers and related components.
- 02.50 Visually inspect constant velocity (CV) axle shaft boots.

### Tire Inspection

- 02.51 Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).
- 02.52 Identify nitrogen-filled tires.
- 02.53 Inspect tires; inspect spare and mounting system; check and adjust tire pressure.
- 02.54 Rotate tires according to recommendations.
- 02.55 Balance wheel and tire assembly.
- 02.56 Dismount, inspect, and remount tire on wheel.
- 02.57 Repair tire according to industry standards.
- 02.58 Reinstall wheel; torque wheel fasteners to specification.

### Brake Inspection

- 02.59 Check wheel bearings for play and other signs of wear.
- 02.60 Perform a visual inspection of a brake drum system.
- 02.61 Perform a visual inspection of a disc brake system.
- 02.62 Check parking brake operation; check parking brake components for unusual conditions.
- 02.63 Document damage, unusual conditions and concerns.

### Body Inspection

- 02.64 Check wiper blades, inserts, and arms; replace wiper blades or inserts.
- 02.65 Lubricate door latches and hinges.
- 02.66 Inspect fuel cap and seal.
- 02.67 Charge battery as needed.
- 02.68 Inspect and clean battery hold-downs; repair or replace as needed.
- 02.69 Inspect and clean battery and battery cable clamp connections.
- 02.70 Perform battery, starting, and charging system tests using appropriate tester.
- 02.71 Start vehicle using an auxiliary power supply.
- 02.72 Maintain or restore electronic memory functions if required.
- 02.73 Test and replace fuses; confirm proper circuit operation.

- 02.74 Inspect and replace exterior and courtesy lamps.
- 02.75 Document damage, unusual conditions, and concerns.

26.0 Demonstrate proficiency in appropriate math skills--The student will be able to:

- 26.01 Read and interpret measuring devices (rules and tapes)
- 26.02 Solve number word problems.
- 26.03 Write percents add fractions and decimals.
- 26.04 Solve percent problems.
- 26.05 Find the percent of a number.
- 26.06 Operate a calculator.
- 26.07 Understand and use the metric system.
- 26.08 Convert inches to millimeters and millimeters to inches.
- 26.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 26.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 26.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 26.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 26.13 Understand and interpret gears and gear ratios.

27.0 Demonstrate proficiency in appropriate understanding of basic sciences--The student will be able to:

- 27.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 27.02 Draw conclusions or make inferences from data.
- 27.03 Related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
- 27.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

28.0 Demonstrate proficiency in employability skills--The student will be able to:

- 28.01 Identify employment requirements for an automotive career.
- 28.02 Identify documents which may be required when applying for a job.
- 28.03 Complete a job application form correctly.
- 28.04 Identify and adopt acceptable work habits.
- 28.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens.
- 28.06 Demonstrate appropriate telephone/communication skills.
- 28.07 Conduct a job search.
- 28.08 Demonstrate competence in job interview techniques.
- 28.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
- 28.10 Demonstrate knowledge of how to make job changes appropriately.

- 29.0 Demonstrate proficiency in appropriate communication skills--The student will be able to:
- 29.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 29.02 Read and follow written and oral instructions.
  - 29.03 Answer and ask questions coherently and concisely.
  - 29.04 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 30.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry--The student will be able to:
- 30.01 Explain the effects of chemical/substance abuse.
  - 30.02 Identify principles of stress management.
  - 30.03 Identify and define career opportunities in the automotive service industry.
  - 30.04 Demonstrate acceptable industry dress code.
  - 30.05 Identify and demonstrate proper customer relation skills.
  - 30.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
  - 30.07 Identify principles of time management.
  - 30.08 Identify acceptable customer relations.
- 31.0 Demonstrate proficiency in understanding of entrepreneurship--The student will be able to:
- 31.01 Define entrepreneurship.
  - 31.02 Describe the importance of entrepreneurship to the American economy.
  - 31.03 List the advantages and disadvantages of business ownership.
  - 31.04 Identify the risks involved in ownership of business.
  - 31.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 31.06 Identify the business skills needed to operate a small business efficiently and effectively.
  - 31.07 Identify and apply communication skills used in automotive careers.

**Course Number: AER0110**

**Occupational Completion Point: B**

**Engine Repair Technician – 150 Hours – SOC Code 49-3023**

- 32.0 Demonstrate proficiency in general engine diagnosis --The student will be able to:
- 32.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
  - 32.02 Identify and interpret engine concern; determine necessary action. P-1
  - 32.03 Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. P-1
  - 32.04 Locate and interpret vehicle and major component identification numbers. P-1
  - 32.05 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1

- |       |  |     |
|-------|--|-----|
| 32.06 | Diagnose engine noises and vibrations; determine necessary action.   | P-2 |
| 32.07 | Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action.   | P-2 |
| 32.08 | Perform engine vacuum tests; determine necessary action.   | P-1 |
| 32.09 | Perform cylinder power balance tests; determine necessary action.  | P-2 |
| 32.10 | Perform cylinder cranking and running compression tests; determine necessary action.   | P-1 |
| 32.11 | Perform cylinder leakage tests; determine necessary action.  | P-1 |
| 32.12 | Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.   | P-2 |
| 32.13 | Install engine covers using gaskets, seals and sealers as required.  | P-1 |
| 32.14 | Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.  | P-1 |
| 32.15 | Inspect, remove and replace engine mounts.   | P-2 |
| 33.0  | <u>Demonstrate proficiency in cylinder head and valve train diagnosis and repair –</u><br>The student will be able to:   |     |
| 33.01 | Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.   | P-1 |
| 33.02 | Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.   | P-1 |
| 33.03 | Inspect valve springs for squareness and free height comparison; determine necessary action.   | P-3 |
| 33.04 | Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action.   | P-3 |
| 33.05 | Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.  | P-3 |
| 33.06 | Inspect valves and valve seats; determine necessary action.  | P-3 |
| 33.07 | Check valve spring assembled height and valve stem height; determine necessary action.   | P-3 |
| 33.08 | Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.   | P-2 |
| 33.09 | Inspect valve lifters; determine necessary action.   | P-2 |
| 33.10 | Adjust valves (mechanical or hydraulic lifters).   | P-1 |
| 33.11 | Inspect and replace camshaft and drive belt/chain (includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and variable valve timing components). | P-1 |
| 33.12 | Inspect and/or measure camshaft for runout, journal wear and lobe wear.  | P-2 |
| 33.13 | Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.  | P-2 |
| 33.14 | Establish camshaft position sensor indexing.   | P-1 |
| 34.0  | <u>Demonstrate proficiency in engine block diagnosis and repair –</u> The student will be able to:   |     |
| 34.01 | Disassemble engine block; clean and prepare components for inspection and reassembly.  | P-1 |

- 34.02 Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. P-2
- 34.03 Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action. P-2
- 34.04 Deglaze and clean cylinder walls. P-2
- 34.05 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. P-3
- 34.06 Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine necessary action. P-1
- 34.07 Inspect main and connecting rod bearings for damage and wear; determine necessary action. P-2
- 34.08 Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action. P-3
- 34.09 Inspect and measure piston skirts and ring lands; determine necessary action. P-2
- 34.10 Remove and replace piston pin. P-3
- 34.11 Determine piston-to-bore clearance. P-2
- 34.12 Inspect, measure, and install piston rings. P-2
- 34.13 Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance or silencer); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time. P-2
- 34.14 Remove, inspect or replace crankshaft vibration damper (harmonic balancer). P-2
- 34.15 Assemble engine block. P-1
- 35.0 Demonstrate proficiency in lubrication and cooling systems diagnosis and repairs –  
The student will be able to:
- 35.01 Perform oil pressure tests; determine necessary action. P-1
- 35.02 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action. P-2
- 35.03 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; determine necessary action. P-1
- 35.04 Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. P-1
- 35.05 Inspect and replace engine cooling and heater system hoses. P-1
- 35.06 Inspect, test, and replace thermostat and gasket/seal. P-1
- 35.07 Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required. P-1
- 35.08 Inspect, remove and replace water pump. P-2
- 35.09 Remove and replace radiator. P-2
- 35.10 Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams. P-1
- 35.11 Inspect auxiliary coolers; determine necessary action. P-3
- 35.12 Inspect, test, and replace oil temperature and pressure switches and sensors. P-2

- 35.13 Perform oil and filter change. P-1
- 35.14 Identify causes of engine overheating. P-1
- 36.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 36.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 36.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 36.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 37.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 37.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 37.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 37.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 37.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 38.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 38.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 38.02 Explain emergency procedures to follow in response to workplace accidents.
- 38.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: AER0257****Occupational Completion Point: C****Automatic Transmission and Transaxle Technician – 150 Hours – SOC Code 49-3023**

- 51.0 Demonstrate proficiency in the operation, diagnosis and servicing of automatic transmission/transaxle. --The student will be able to:
- 51.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
- 51.02 Identify and interpret transmission/transaxle concern; differentiate between engine performance and transmission/transaxle concerns; determine necessary action. P-1
- 51.03 Research applicable vehicle and service information, such as transmission/transaxle system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
- 51.04 Locate and interpret vehicle and major component identification numbers. P-1
- 51.05 Diagnose fluid loss and condition concerns; check fluid level in transmissions with and without dip-stick; determine necessary action. P-1



- 51.06 Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action. P-1
- 51.07 Perform stall test; determine necessary action. P-3
- 51.08 Perform lock-up converter system tests; determine necessary action. P-3
- 51.09 Diagnose noise and vibration concerns; determine necessary action. P-2
- 51.10 Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles. P-1
- 51.11 Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law). P-2
- 51.12 Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information. P-1
- 52.0 Use information technology tools. -- The students will be able to:
- 52.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 52.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 52.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 52.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 53.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 53.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 53.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 53.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 53.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 54.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 54.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 54.02 Describe the effect of money management on personal and career goals. FL 3.0
- 54.03 Develop a personal budget and financial goals. FL3.1
- 54.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 54.05 Maintain financial records. FL3.3
- 54.06 Read and reconcile financial statements. FL3.4
- 54.07 Research, compare and contrast investment opportunities.
- 55.0 Demonstrate proficiency in transmission/transaxle maintenance, adjustment and in-vehicle transmission/transaxle repair --The student will be able to:
- 55.01 Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch. P-2
- 55.02 Inspect and replace external seals, gaskets, and bushings. P-2

- 55.03 Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses. P-1
- 55.04 Diagnose electronic transmission control systems using a scan tool; determine necessary action. P-1
- 55.05 Inspect, replace, and align powertrain mounts. P-2
- 55.06 Service transmission; perform visual inspection; replace fluid and filters. P-1
- 56.0 Demonstrate proficiency in off-vehicle transmission/transaxle repair (removal, disassembly, and reinstallation), oil pump and converter--the student will be able to:
- 56.01 Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces. P-1
- 56.02 Disassemble, clean, and inspect transmission/transaxle. P-1
- 56.03 Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets). P-2
- 56.04 Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action. P2
- 56.05 Assemble transmission/transaxle. P-1
- 56.06 Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings. P-1
- 56.07 Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore. P-2
- 56.08 Install and seat torque converter to engage drive/splines. P-1
- 56.09 Inspect, measure, and reseal oil pump assembly and components. P-1
- 56.10 Measure transmission/transaxle end play or preload; determine necessary action. P-1
- 56.11 Inspect, measure, and replace thrust washers and bearings. P-2
- 56.12 Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls. P-2
- 57.0 Demonstrate proficiency in gear train, shafts, bushings, case, friction units and reaction units --The student will be able to:
- 57.01 Inspect bushings; determine necessary action. P-2
- 57.02 Inspect and measure planetary gear assembly components; determine necessary action. P-2
- 57.03 Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. P-2
- 57.04 Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action. P-2
- 57.05 Inspect, measure, repair, adjust or replace transaxle final drive components. P-2
- 57.06 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action. P-2
- 57.07 Measure clutch pack clearance; determine necessary action. P-1
- 57.08 Air test operation of clutch and servo assemblies. P-1

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|-------|---|-----|
| 57.09 | Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; determine necessary action. | P-1 |
| 57.10 | Inspect bands and drums; determine necessary action.  | P-2 |
| 57.11 | Describe the operational characteristics of a continuously variable transmission (CVT)                              | P-3 |
| 57.12 | Describe the operational characteristics of a hybrid vehicle drive train.   | P-3 |

**Course Number: AER0274****Occupational Completion Point: D****Manual Drivetrain And Axle Technician – 150 Hours – SOC Code 49-3023**

44.0 Demonstrate proficiency in general drive train diagnosis, clutch diagnosis and repair –  
The student will be able to:

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|-------|---|-----|
| 44.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                               | P-1 |
| 44.02 | Identify and interpret drive train concern; determine necessary action.   | P-1 |
| 44.03 | Research applicable vehicle and service information, such as drive train system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 44.04 | Locate and interpret vehicle and major component identification numbers.  | P-1 |
| 44.05 | Diagnose fluid loss, level, and condition concerns; determine necessary action.   | P-1 |
| 44.06 | Drain and fill manual transmission/transaxle and final drive unit.  | P-1 |
| 44.07 | Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.   | P-1 |
| 44.08 | Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.   | P-1 |
| 44.09 | Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.  | P-1 |
| 44.10 | Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).                                  | P-1 |
| 44.11 | Bleed clutch hydraulic system.  | P-1 |
| 44.12 | Inspect flywheel and ring gear for wear and cracks; determine necessary action.   | P-1 |
| 44.13 | Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.    | P-1 |
| 44.14 | Measure flywheel runout and crankshaft end play; determine necessary action.  | P-2 |

45.0 Demonstrate proficiency in transmission & transaxle diagnosis and repair --The student will be able to:

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|-------|---|-----|
| 45.01 | Remove and reinstall transmission/transaxle.  | P-1 |
| 45.02 | Disassemble, clean, and reassemble transmission/transaxle components.   | P-1 |
| 45.03 | Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. | P-2 |
| 45.04 | Diagnose noise concerns using transmission/transaxle powerflow principles.  | P-2 |

- 45.05 Diagnose hard shifting and jumping out of gear concerns; determine necessary action. P-2
- 45.06 Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. P-2
- 45.07 Inspect, replace, and align powertrain mounts. P-2
- 45.08 Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. P-2
- 45.09 Remove and replace transaxle final drive. P-3
- 45.10 Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs. P-2
- 45.11 Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. P-1
- 45.12 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. P-1
- 45.13 Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action. P-3
- 45.14 Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. P-3
- 45.15 Inspect lubrication devices (oil pump or slingers); perform necessary action. P-3
- 45.16 Inspect, test, and replace transmission/transaxle sensors and switches. P-2
- 45.17 Describe the operational characteristics of an electronically controlled manual transmission/transaxle. P-3
- 46.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 46.01 Describe the nature and types of business organizations. SY 1.0
- 46.02 Explain the effect of key organizational systems on performance and quality.
- 46.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 46.04 Explain the impact of the global economy on business organizations.
- 47.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 47.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 47.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 47.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 47.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 48.0 Demonstrate proficiency in drive and half shaft universal and constant-velocity (CV) joint diagnosis and repair --The student will be able to:
- 48.01 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. P-1
- 48.02 Diagnose universal joint noise and vibration concerns; perform necessary action. P-2

- 48.03 Remove and replace front wheel drive (FWD) front wheel bearing (hub bearing). P-1
- 48.04 Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1
- 48.05 Inspect, service, and replace shaft center support bearings. P-3
- 48.06 Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles. P-2
- 49.0 Demonstrate proficiency in rear axle diagnosis and repair; ring and pinion gears, differential case assembly and limited slip differential –The student will be able to:
- 49.01 Diagnose noise and vibration concerns; determine necessary action. P-2
- 49.02 Diagnose fluid leakage concerns; determine necessary action. P-1
- 49.03 Inspect and replace companion flange and pinion seal; measure companion flange runout. P-2
- 49.04 Inspect ring gear and measure runout; determine necessary action. P-2
- 49.05 Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. P-2
- 49.06 Measure and adjust drive pinion depth. P-2
- 49.07 Measure and adjust drive pinion bearing preload. P-2
- 49.08 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). P-2
- 49.09 Check ring and pinion tooth contact patterns; perform necessary action. P-1
- 49.10 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2
- 49.11 Reassemble and reinstall differential case assembly; measure runout; determine necessary action. P-2
- 49.12 Diagnose limited slip differential noise, slippage, and chatter concerns; determine necessary action. P-3
- 49.13 Clean and inspect differential housing; refill with correct lubricant and/or additive. P-2
- 49.14 Inspect and reinstall limited slip differential components. P-3
- 49.15 Measure rotating torque; determine necessary action. P-3
- 49.16 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. P-2
- 49.17 Inspect and replace drive axle shaft wheel studs. P-1
- 49.18 Remove and replace drive axle shafts. P-1
- 49.19 Inspect and replace drive axle shaft seals, bearings, and retainers. P-2
- 49.20 Measure drive axle flange runout and shaft end play; determine necessary action. P-2
- 50.0 Demonstrate proficiency in drive axle shaft and four-wheel drive/all-wheel drive component diagnosis and repair --The student will be able to:
- 50.02 Diagnose noise, vibration, and unusual steering concerns; determine necessary action. P-3
- 50.03 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-3
- 50.04 Remove and reinstall transfer case. P-3
- 50.05 Disassemble, service, and reassemble transfer case and components. P-3

- 50.06 Inspect front-wheel bearings and locking hubs; perform necessary action. P-3
- 50.07 Check drive assembly seals and vents; check lube level. P-3
- 50.08 Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems. P-3
- 50.09 Identify concerns related to variations in tire circumference and/or final drive ratios. P-3

**Course Number: AER0453****Occupational Completion Point: E****Automotive Suspension And Steering Technician – 150 Hours – SOC Code 49-3023**09.0 Demonstrate proficiency in general suspension and steering system diagnosis--

The student will be able to:

- 09.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
- 09.02 Identify and interpret suspension and steering system concerns; determine necessary action. P-1
- 09.03 Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. P-1
- 09.04 Locate and interpret vehicle and major component identification numbers. P-1

10.0 Demonstrate proficiency in suspension systems diagnosis and repair; front suspensions –

The student will be able to:

- 10.01 Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
- 10.02 Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
- 10.03 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-2
- 10.04 Remove, inspect and install strut rods and bushings. P-2
- 10.05 Remove, inspect, and install upper and/or lower ball joints. P-1
- 10.06 Remove, inspect, and install steering knuckle assemblies. P-2
- 10.07 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-3
- 10.08 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3
- 10.09 Remove, inspect, and install stabilizer bar bushings, brackets, and links. P-2
- 10.10 Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. P-1
- 10.11 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3

11.0 Demonstrate proficiency in steering systems diagnosis and repair; rear suspensions, wheel alignment diagnosis, adjustment, repair and miscellaneous service --The student will be able to:

- 11.01 Disable and enable supplemental restraint system (SRS). P-1

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| 11.02 | Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).  | P-1 |
| 11.03 | Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.                                    | P-2 |
| 11.04 | Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action. | P-2 |
| 11.05 | Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.     | P-2 |
| 11.06 | Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.  | P-2 |
| 11.07 | Adjust non-rack and pinion worm bearing preload and sector lash.   | P-3 |
| 11.08 | Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.  | P-2 |
| 11.09 | Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.  | P-2 |
| 11.10 | Determine proper power steering fluid type; inspect fluid level and condition.   | P-1 |
| 11.11 | Flush, fill, and bleed power steering system.  | P-2 |
| 11.12 | Diagnose power steering fluid leakage; determine necessary action.   | P-2 |
| 11.13 | Remove, inspect, replace, and adjust power steering pump belt.   | P-1 |
| 11.14 | Remove and reinstall power steering pump.  | P-2 |
| 11.15 | Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.  | P-2 |
| 11.16 | Inspect and replace power steering hoses and fittings.   | P-2 |
| 11.17 | Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.                                   | P-2 |
| 11.18 | Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.  | P-1 |
| 11.19 | Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action.                                    | P-3 |
| 11.20 | Inspect and test electric power assist steering.   | P-3 |
| 11.21 | Identify hybrid vehicle power steering system electrical circuits, service and safety precautions.   | P-3 |
- 12.0 Demonstrate proficiency in wheel and tire diagnosis and repair --The student will be able to:
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| 12.01 | Inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action. |
| 12.02 | Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.                                   |
| 12.03 | Rotate tires according to manufacturer's recommendations.   |
| 12.04 | Measure wheel, tire, axle flange, and hub runout; determine necessary action.                                   |
| 12.05 | Diagnose tire pull problems; determine necessary action.  |
| 12.06 | Dismount, inspect, and remount tire on wheel; Balance wheel and tire assembly (static and dynamic).             |

- 12.07 Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
- 12.08 Reinstall wheel; torque lug nuts.
- 12.09 Inspect tire and wheel assembly for air loss; perform necessary action.
- 12.10 Repair tire using internal patch.
- 12.11 Inspect, diagnose, and calibrate tire pressure monitoring system.

**Course Number: AER0418****Occupational Completion Point: F****Automotive Brake System Technician – 150 Hours – SOC Code 49-3023**

- 03.0 Demonstrate proficiency in general brake system diagnosis and hydraulic system diagnosis and repair--The student will be able to:
- 03.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
  - 03.02 Identify and interpret brake system concern; determine necessary action. P-1
  - 03.03 Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins. P-1
  - 03.04 Locate and interpret vehicle and major component identification numbers. P-1
  - 03.05 Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). P-1
  - 03.06 Measure brake pedal height, travel, and free play (as applicable); determine necessary action. P-1
  - 03.07 Check master cylinder for internal/external leaks and proper operation; determine necessary action. P-1
  - 03.08 Remove, bench bleed, and reinstall master cylinder. P-1
  - 03.09 Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action. P-2
  - 03.10 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. P-1
  - 03.11 Replace brake lines, hoses, fittings, and supports. P-2
  - 03.12 Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). P-2
  - 03.13 Select, handle, store, and fill brake fluids to proper level. P-1
  - 03.14 Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. P-3
  - 03.15 Inspect, test, and/or replace components of brake warning light system. P-3
  - 03.16 Bleed and/or flush brake system. P-1
  - 03.17 Test brake fluid for contamination. P-1
- 04.0 Demonstrate proficiency in drum brake diagnosis and repair --the student will be able to:
- 04.01 Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
  - 04.02 Remove, clean, inspect, and measure brake drums; determine necessary action. P-1



- 04.03 Refinish brake drum; measure final drum diameter. P-1
- 04.04 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-1
- 04.05 Inspect and install wheel cylinders. P-2
- 04.06 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings. P-2
- 04.07 Install wheel, torque lug nuts, and make final checks and adjustments. P-1
- 05.0 Demonstrate proficiency in the operation of disc brake diagnosis and repair--The student will be able to:
- 05.01 Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action. P-1
- 05.02 Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action. P-1
- 05.03 Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action. P-1
- 05.04 Remove, inspect and replace pads and retaining hardware; determine necessary action. P-1
- 05.05 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. P-3
- 05.06 Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. P-1
- 05.07 Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action P-1
- 05.08 Remove and reinstall rotor. P-1
- 05.09 Refinish rotor on vehicle; measure final rotor thickness. P-1
- 05.10 Refinish rotor off vehicle; measure final rotor thickness. P-1
- 05.11 Retract caliper piston on an integrated parking brake system. P-3
- 05.12 Install wheel, torque lug nuts, and make final checks and adjustments. P-1
- 05.13 Check brake pad wear indicator system operation; determine necessary action. P-2
- 06.0 Demonstrate proficiency in the operation of power assist units diagnosis and repair--The student will be able to:
- 06.01 Test pedal free travel; check power assist operation. P-2
- 06.02 Check vacuum supply to vacuum-type power booster. P-1
- 06.03 Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action. P-1
- 06.04 Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action. P-3
- 06.05 Measure and adjust master cylinder pushrod length. P-3
- 07.0 Demonstrate proficiency in miscellaneous (wheel bearings, parking brakes, electrical, etc.) diagnosis and repair--The student will be able to:
- 07.01 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. P-1

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| 07.02 | Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.             | P-1 |
| 07.03 | Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed. | P-2 |
| 07.04 | Check parking brake and indicator light system operation; determine necessary action.                                      | P-1 |
| 07.05 | Check operation of brake stop light system; determine necessary action.  | P-1 |
| 07.06 | Replace wheel bearing and race.  | P-2 |
| 07.07 | Inspect and replace wheel studs.   | P-1 |
| 07.08 | Remove and reinstall sealed wheel bearing assembly.  | P-1 |
- 08.0 Demonstrate proficiency in electronic brake, traction and stability control systems diagnosis and repair --The student will be able to:
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|-------|--|--|
| 08.01 | Identify and inspect electronic brake control system components; determine necessary action.   |  |
| 08.02 | Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.   |  |
| 08.03 | Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.   |  |
| 08.04 | Depressurize high-pressure components of the electronic brake control system.  |  |
| 08.05 | Bleed the electronic brake control system hydraulic circuits.  |  |
| 08.06 | Remove and install electronic brake control system electrical/electronic and hydraulic components.   |  |
| 08.07 | Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data). |  |
| 08.08 | Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).   |  |
| 08.09 | Identify traction control/vehicle stability control system components.   |  |
| 08.10 | Describe the operation of a regenerative braking system.   |  |

**Course Number: AER0360**

**Occupational Completion Point: G**

**Automotive Electrical/Electronic System Technician – 300 Hours – SOC Code 49-3023**

- 13.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components related to power train--The student will be able to:
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| 13.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. | P-1 |
| 13.02 | Identify and interpret electrical/electronic system concern; determine necessary action.  | P-1 |

- 13.03 Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. P-1
- 13.04 Locate and interpret vehicle and major component identification numbers. P-1
- 13.05 Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). P-1
- 13.06 Use wiring diagrams during diagnosis of electrical circuit problems. P-1
- 13.07 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance. P-1
- 13.08 Check electrical circuits with a test light; determine necessary action. P-2
- 13.09 Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs. P-2
- 13.10 Check electrical circuits using fused jumper wires; determine necessary action. P-2
- 13.11 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. P-1
- 13.12 Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action. P-1
- 13.13 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1
- 13.14 Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action. P-1
- 13.15 Remove and replace terminal end from connector; replace connectors and terminal ends. P-1
- 13.16 Repair wiring harness (including CAN/BUS systems). P-1
- 13.17 Perform solder repair of electrical wiring. P-1
- 13.18 Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures P-2
- 14.0 Demonstrate proficiency in battery diagnosis and service --The student will be able to:
- 14.01 Perform battery state-of-charge test; determine necessary action. P-1
- 14.02 Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. P-1
- 14.03 Maintain or restore electronic memory functions. P-1
- 14.04 Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs. P-1
- 14.05 Perform battery charge. P-1
- 14.06 Start a vehicle using jumper cables or an auxiliary power supply. P-1
- 14.07 Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions. P-3
- 14.08 Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect. P-1
- 14.09 Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures. P-3
- 15.0 Demonstrate proficiency in starting system diagnosis and repair --The student will be able to:
- 15.01 Perform starter current draw tests; determine necessary action. P-1
- 15.02 Perform starter circuit voltage drop tests; determine necessary action. P-1

- 15.03 Inspect and test starter relays and solenoids; determine necessary action. P-2
- 15.04 Remove and install starter in a vehicle. P-1
- 15.05 Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action. P-2
- 15.06 Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition. P-2
- 16.0 Demonstrate proficiency in charging system diagnosis and repair --The student will be able to:
- 16.01 Perform charging system output test; determine necessary action. P-1
- 16.02 Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions. P-1
- 16.03 Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment. P-1
- 16.04 Remove, inspect, and install generator (alternator). P-1
- 16.05 Perform charging circuit voltage drop tests; determine necessary action. P-1
- 17.0 Demonstrate proficiency in lighting systems, gauges, warning devices, and driver information systems diagnosis and repair --The student will be able to:
- 17.01 Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. P-1
- 17.02 Inspect, replace, and aim headlights and bulbs. P-2
- 17.03 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. P-2
- 17.04 Identify system voltage and safety precautions associated with high intensity discharge headlights. P-2
- 17.05 Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action. P-1
- 17.06 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. P-3
- 17.07 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. P-1
- 17.08 Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action. P-3
- 18.0 Demonstrate proficiency in horn and wiper/washer and accessories diagnosis and repair --The student will be able to:
- 18.01 Diagnose incorrect horn operation; perform necessary action. P-1
- 18.02 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-1
- 18.03 Diagnose incorrect washer operation; perform necessary action. P-2
- 18.04 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. P-1
- 18.05 Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. P-3
- 18.06 Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action. P-1
- 18.07 Diagnose incorrect operation of cruise control systems; determine necessary action. P-3

18.08	Diagnose supplemental restraint system (SRS) concerns; determine necessary action.	P-1
18.09	Disarm and enable the airbag system for vehicle service.	P-1
18.10	Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.	P-3
18.11	Remove and reinstall door panel.	P-1
18.12	Diagnose body electronic system circuits using a scan tool; determine necessary action.	P-2
18.13	Check for module communication (including CAN/BUS systems) errors using a scan tool.	P-2
18.14	Diagnose the cause of false, intermittent, or no operation of anti-theft systems.	P-3
18.15	Describe the operation of keyless entry/remote-start systems.	P-3
18.16	Perform software transfers, software updates, or flash reprogramming on electronic modules.	P-3

**Course Number: AER0172****Occupational Completion Point: H****Automotive Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3023****39.0 Demonstrate proficiency in A/C system diagnosis and repair --The student will be able to:**

39.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1
39.02	Identify and interpret heating and air conditioning concern; determine necessary action.	P-1
39.03	Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins.	P-1
39.04	Locate and interpret vehicle and major component identification numbers.	P-1
39.05	Performance test A/C system; identify A/C system malfunctions.	P-1
39.06	Identify abnormal operating noises in the A/C system; determine necessary action.	P-2
39.07	Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings.	P-1
39.08	Leak test A/C system; determine necessary action.	P-1
39.09	Inspect the condition of refrigerant oil removed from the system; determine necessary action.	P-2
39.10	Determine recommended oil and oil capacity for system application.	P-1
39.11	Using scan tool, observe and record related HVAC data and trouble codes.	P-1

**40.0 Demonstrate proficiency in refrigeration system component diagnosis and repair of compressor, compressor clutch, evaporator, receiver/drier, condenser, etc. -- The student will be able to:**

40.01	Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.	P-2
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| 40.02 | Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.  | P-1 |
| 40.03 | Inspect, test, and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap and adjust as needed..  | P-2 |
| 40.04 | Remove, inspect, and reinstall A/C compressor and mountings; determine required oil quantity.   | P-1 |
| 40.05 | Identify hybrid vehicle A/C system electrical circuits, service and safety precautions.   | P-3 |
| 40.06 | Determine the need for an additional A/C system filter; perform necessary action.   | P-3 |
| 40.07 | Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.   | P-2 |
| 40.08 | Inspect A/C condenser for airflow restrictions; perform necessary action.   | P-1 |
| 40.09 | Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity.  | P-1 |
| 40.10 | Remove, inspect, and install expansion valve or orifice (expansion) tube.   | P-1 |
| 40.11 | Inspect evaporator housing water drain; perform necessary action.   | P-2 |
| 40.12 | Remove, inspect, and reinstall evaporator; determine required oil quantity.   | P-3 |
| 40.13 | Remove, inspect, and reinstall condenser; determine required oil quantity.  | P-3 |
| 41.0  | <u>Demonstrate proficiency in heating and engine cooling systems diagnosis and repair</u><br>--The student will be able to:   |     |
| 41.01 | Diagnose temperature control problems in the heater/ventilation system; determine necessary action.   | P-2 |
| 41.02 | Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. | P-1 |
| 41.03 | Inspect engine cooling and heater system hoses and belts; perform necessary action.   | P-1 |
| 41.04 | Inspect, test, and replace thermostat and gasket/seal.  | P-1 |
| 41.05 | Determine coolant condition and coolant type for vehicle application; drain and recover coolant.  | P-1 |
| 41.06 | Flush system; refill system with recommended coolant; bleed system.   | P-2 |
| 41.07 | Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.   | P-1 |
| 41.08 | Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.   | P-1 |
| 41.09 | Inspect and test heater control valve(s); perform necessary action.   | P-2 |
| 41.10 | Remove, inspect, and reinstall heater core.   | P-3 |
| 42.0  | <u>Demonstrate proficiency in A/C operating systems and related controls diagnosis and repairs</u><br>--The student will be able to:  |     |
| 42.01 | Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action.   | P-2 |
| 42.02 | Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.  | P-1 |
| 42.03 | Test and diagnose A/C compressor clutch control systems; determine necessary action.  | P-1 |

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| 42.04 | Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. | P-2 |
| 42.05 | Inspect and test A/C-heater control panel assembly; determine necessary action.   | P-3 |
| 42.06 | Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.   | P-3 |
| 42.07 | Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.  | P-2 |
| 42.08 | Identify the source of A/C system odors.  | P-2 |
| 42.09 | Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.                           | P-2 |
| 43.0  | <u>Demonstrate proficiency in refrigerant recovery, recycling, and handling</u> --The student will be able to:  |     |
| 43.01 | Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.  | P-1 |
| 43.02 | Identify and recover A/C system refrigerant.  | P-1 |
| 43.03 | Recycle, label, and store refrigerant.  | P-1 |
| 43.04 | Evacuate and charge A/C system; add refrigerant oil as required.  | P-1 |

**Course Number: AER0503****Occupational Completion Point: I****Automotive Engine Performance Technician – 300 Hours – SOC Code 49-3023**

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| 19.0  | <u>Demonstrate proficiency in general engine diagnosis</u> --The student will be able to:   |     |
| 19.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                         | P-1 |
| 19.02 | Identify and interpret engine performance concern; determine necessary action.  | P-1 |
| 19.03 | Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 19.04 | Locate and interpret vehicle and major component identification numbers.  | P-1 |
| 19.05 | Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.  | P-2 |
| 19.06 | Diagnose abnormal engine noise or vibration concerns; determine necessary action.   | P-3 |
| 19.07 | Diagnose abnormal exhaust color, odor, and sound; determine necessary action.   | P-2 |
| 19.08 | Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.   | P-1 |
| 19.09 | Perform cylinder power balance test; determine necessary action.  | P-2 |
| 19.10 | Perform cylinder cranking and running compression tests; determine necessary action.  | P-1 |
| 19.11 | Perform cylinder leakage test; determine necessary action.  | P-1 |

- 19.12 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action. P-1
- 19.13 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action. P-3
- 19.14 Verify engine operating temperature; determine necessary action. P-1
- 19.15 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action. P-1
- 19.16 Verify correct camshaft timing. P-1
- 20.0 Demonstrate proficiency in computerized engine controls diagnosis and repair --The student will be able to:
- 20.01 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. P-1
- 20.02 Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data. P-1
- 20.03 Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action. P-1
- 20.04 Check for module communication (including CAN/BUS systems) errors using a scan tool. P-2
- 20.05 Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action. P-1
- 20.06 Access and use service information to perform step-by-step diagnosis. P-1
- 20.07 Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action. P-3
- 20.08 Perform active tests of actuators using a scan tool; determine necessary action. P-1
- 20.09 Describe the importance of running all OBDII monitors for repair verification. P-1
- 21.0 Demonstrate proficiency in ignition system diagnosis and repair--The student will be able to:
- 21.01 Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action. P-1
- 21.01 Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. P-1
- 21.02 Inspect and test crankshaft and camshaft position sensor(s); perform necessary action. P-1
- 21.03 Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary. P-2
- 22.0 Demonstrate proficiency in fuel, air induction and exhaust systems diagnosis and repair --The student will be able to:
- 22.01 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle



- speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action. P-1
- 22.02 Check fuel for contaminants and quality; determine necessary action. P-2
- 22.03 Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action. P-1
- 22.04 Replace fuel filters. P-2
- 22.05 Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. P-2
- 22.06 Inspect and test fuel injectors. P-1
- 22.07 Verify idle control operation. P-1
- 22.08 Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. P-1
- 22.09 Perform exhaust system back-pressure test; determine necessary action. P-1
- 22.10 Test the operation of turbocharger/supercharger systems; determine necessary action. P-3
- 23.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair. --The student will be able to:
- 23.01 Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action. P-2
- 23.02 Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. P-2
- 23.03 Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action. P-1
- 24.0 Demonstrate proficiency in emissions controls systems --The student will be able to:
- 24.01 Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. P-1
- 24.02 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. P-2
- 24.03 Diagnose emissions and driveability concerns caused by the secondary air injection and catalytic converter systems; determine necessary action. P-2
- 24.04 Inspect and test mechanical components of secondary air injection systems; perform necessary action. P-3
- 24.05 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. P-3
- 24.06 Inspect and test catalytic converter efficiency. P-1
- 24.07 Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action. P-1
- 24.08 Inspect and test components and hoses of the evaporative emissions control system; perform necessary action. P-1
- 24.09 Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action. P-1
- 25.0 Demonstrate proficiency in engine related service --The student will be able to:

- 25.01 Adjust valves on engines with mechanical or hydraulic lifters. P-1
- 25.02 Remove and replace timing belt; verify correct camshaft timing. P-1
- 25.03 Remove and replace thermostat and gasket/seal. P-1
- 25.04 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. P-1
- 25.05 Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert. P-1
- 25.06 Perform engine oil and filter change. P-1
- 25.07 Identify hybrid vehicle internal combustion engine service precautions. P-3

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 1  
**Course Number:** 8709410  
**Course Credit:** 1

**Course Description:**

01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.5, MA.912.A.1.1, MA.912.A.2.1, MA.912.A.2.7, MA.912.A.1.4, MA.912.A.3.3, MA.912.A.10.1, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.3, and MA.912.S.1.2

- 01.01 Apply shop safety rules, EPA and OSHA standards.
- 01.02 Identify and use appropriate emergency first aid procedures
- 01.03 Identify, use and maintain hand and power tools properly.
- 01.04 Identify and practice using appropriate precision-measuring tools and torque methods.
- 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.
- 01.06 Identify and use Metric and English measurement skills.
- 01.07 Use computer and operate keyboard.
- 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
- 01.09 Identify and describe typical automotive lubricants and lubricant properties.
- 01.10 Interpret the Federal 'Workers Right To Know Law'.
- 01.11 Identify and describe typical automotive seals and gaskets.
- 01.12 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information. 01.13 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.01.14 Describe and identify supplemental restraint systems (SRS).
- 01.13 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

02.0 Demonstrate proficiency in routine maintenance and consumer services (AKA light line AKA general service technician) --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.A.1.4, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.1.4 SC.912.P.12.3, SC.912.P.10.3, SC.912.E.6.6, SC.912.L.17.15 SC.912.P12.2, SC.912.P10.4 SC.912.P10.1, SC.912.P10.2 SC.912.P12.10 SC.912.P.10.15, SC.912.P.10.14, SC.912.P.10.13, SC.912.P.8.2, SC.912.P.8.8 SC.912.N.1.3, SC.912.N.4.1, MA.912.S.1.2

- 02.01 Identify information needed for the service requested on a repair order.

- 02.02 Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.
- 02.03 Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.
- 02.04 Determine the presence of a Tire Pressure Monitoring System (TPMS).
- 02.05 Determine the presence of wheel locks.
- 02.06 Determine the presence of an air suspension system.
- 02.07 Check operation and status of instrument panel warning lights and gauges.

#### Locating Information

- 02.08 Locate and use the Vehicle Identification Number (VIN).
- 02.09 Locate and use vehicle information placards, decals, tags, as required.
- 02.10 Locate and use paper and electronic manuals.
- 02.11 Locate and use technical service bulletins (TSBs).
- 02.12 Locate and use material safety data sheets (MSDS).

#### Tools and Equipment

- 02.13 Identify tools and equipment and their appropriate usage in automotive applications.
- 02.14 Identify standard and metric designation.
- 02.15 Identify and use proper placement of floor jacks and jack stands.
- 02.16 Identify and use proper procedures for safe lift usage.
- 02.17 Identify and use proper procedures for safe pit usage.
- 02.18 Use proper ventilation procedures for working within the shop area.
- 02.19 Use proper handling procedures for automotive fluids.
- 02.20 Use proper chemicals for cleaning and lubrication.

#### Preparing Vehicle for Customer

- 02.21 Ensure vehicle is prepared to return to customer per company policy (floor mats, steering wheel cover, etc.).
- 02.22 Reset maintenance indicators.
- 02.23 Verify status of instrument panel warning lights and gauges.
- 02.24 Complete documentation on services performed.

#### Underhood Inspection

- 02.25 Inspect underhood area for leaks, damage, and unusual conditions.
- 02.26 Determine fluid type requirements and identify fluid.
- 02.27 Check engine oil level and condition; service as required.
- 02.28 Check engine coolant level and condition; service as required.
- 02.29 Check power steering fluid level and condition; service as required.
- 02.30 Check brake fluid level and condition; service as required.
- 02.31 Check hydraulic clutch fluid and condition; service as required.
- 02.32 Check windshield washer fluid level and condition; service as required.
- 02.33 Check automatic transmission fluid level and condition; service as required.

#### Undercar Inspection

- 02.34 Inspect undercar area for leaks, damage, and unusual conditions.
- 02.35 Check differential/transfer case fluid level; note unusual conditions; service as required.
- 02.36 Check manual transmission fluid level; note unusual conditions; service as required.
- 02.37 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear.
- 02.38 Lubricate driveline, suspension and steering systems.
- 02.39 Inspect cooling system pipes and hoses for wear, damage, and proper routing.

#### Filters and Drive Belts

- 02.40 Change engine oil and filter.
- 02.41 Replace inline fuel filters as applicable.
- 02.42 Inspect and replace air filter.
- 02.43 Inspect and replace cabin air filter.
- 02.44 Inspect, replace and adjust drive belts; inspect tensioners and pulleys.
- 02.45 Document observed damage, unusual conditions, and concerns.

#### Suspension Inspection

- 02.46 Visually inspect struts, springs, and related components.
- 02.47 Visually inspect stabilizer bar, bushings, brackets, and links.
- 02.48 Visually inspect springs, torsion bars, and related components.
- 02.49 Visually inspect shock absorbers and related components.
- 02.50 Visually inspect constant velocity (CV) axle shaft boots.

#### Tire Inspection

- 02.51 Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).
- 02.52 Identify nitrogen-filled tires.
- 02.53 Inspect tires; inspect spare and mounting system; check and adjust tire pressure.
- 02.54 Rotate tires according to recommendations.
- 02.55 Balance wheel and tire assembly.
- 02.56 Dismount, inspect, and remount tire on wheel.
- 02.57 Repair tire according to industry standards.
- 02.58 Reinstall wheel; torque wheel fasteners to specification.

#### Brake Inspection

- 02.59 Check wheel bearings for play and other signs of wear.
- 02.60 Perform a visual inspection of a brake drum system.
- 02.61 Perform a visual inspection of a disc brake system.
- 02.62 Check parking brake operation; check parking brake components for unusual conditions.
- 02.63 Document damage, unusual conditions and concerns.

#### Body Inspection

- 02.64 Check wiper blades, inserts, and arms; replace wiper blades or inserts.
- 02.65 Lubricate door latches and hinges.
- 02.66 Inspect fuel cap and seal.
- 02.67 Charge battery as needed.
- 02.68 Inspect and clean battery hold-downs; repair or replace as needed.
- 02.69 Inspect and clean battery and battery cable clamp connections.
- 02.70 Perform battery, starting, and charging system tests using appropriate tester.
- 02.71 Start vehicle using an auxiliary power supply.
- 02.72 Maintain or restore electronic memory functions if required.
- 02.73 Test and replace fuses; confirm proper circuit operation.
- 02.74 Inspect and replace exterior and courtesy lamps.
- 02.75 Document damage, unusual conditions, and concerns.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 2  
**Course Number:** 8709420  
**Course Credit:** 1

**Course Description:**

26.0 Demonstrate proficiency in appropriate math skills--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.2.2, MA.912.A.1.1, MA.912.A10.1, MA.912.G1.1, MA.912.A.2.13, MA.912.G.8.2, MA.912.A1.4, MA.912.A.1.5, MA.912.G.6.2, MA.912.G.2.5, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.4.1, MA.912.A.5.1,

- 26.01 Read and interpret measuring devices (rules and tapes)
- 26.02 Solve number word problems.
- 26.03 Write percents add fractions and decimals.
- 26.04 Solve percent problems.
- 26.05 Find the percent of a number.
- 26.06 Operate a calculator.
- 26.07 Understand and use the metric system.
- 26.08 Convert inches to millimeters and millimeters to inches.
- 26.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 26.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 26.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 26.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 26.13 Understand and interpret gears and gear ratios.

27.0 Demonstrate proficiency in appropriate understanding of basic sciences--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.3.3, MA.912.A.2.2, MA.912.D.6.3, MA.912.A.1.5, SC.912.P.10.5, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.8.6, SC.912.P.8.8, SC.912.P.10.4, SC.912.N.1.1, SC.912.N.1.6, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.10, and SC.912.P.12.3

- 27.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 27.02 Draw conclusions or make inferences from data.
- 27.03 Related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.

- 27.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 28.0 Demonstrate proficiency in employability skills--The student will be able to:
- 28.01 Identify employment requirements for an automotive career.
  - 28.02 Identify documents which may be required when applying for a job.
  - 28.03 Complete a job application form correctly.
  - 28.04 Identify and adopt acceptable work habits.
  - 28.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens.
  - 28.06 Demonstrate appropriate telephone/communication skills.
  - 28.07 Conduct a job search.
  - 28.08 Demonstrate competence in job interview techniques.
  - 28.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 28.10 Demonstrate knowledge of how to make job changes appropriately.
- 29.0 Demonstrate proficiency in appropriate communication skills--The student will be able to:
- 29.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 29.02 Read and follow written and oral instructions.
  - 29.03 Answer and ask questions coherently and concisely.
  - 29.04 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 30.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry--The student will be able to:
- 30.01 Explain the effects of chemical/substance abuse.
  - 30.02 Identify principles of stress management.
  - 30.03 Identify and define career opportunities in the automotive service industry.
  - 30.04 Demonstrate acceptable industry dress code.
  - 30.05 Identify and demonstrate proper customer relation skills.
  - 30.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
  - 30.07 Identify principles of time management.
  - 30.08 Identify acceptable customer relations.
- 31.0 Demonstrate proficiency in understanding of entrepreneurship--The student will be able to:
- 31.01 Define entrepreneurship.
  - 31.02 Describe the importance of entrepreneurship to the American economy.
  - 31.03 List the advantages and disadvantages of business ownership.
  - 31.04 Identify the risks involved in ownership of business.
  - 31.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 31.06 Identify the business skills needed to operate a small business efficiently and effectively.



31.07 Identify and apply communication skills used in automotive careers.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 3  
**Course Number:** 8709430  
**Course Credit:** 1

**Course Description:**

32.0 Demonstrate proficiency in general engine diagnosis --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.A.2.2, MA.912.D.6.3, MA.912.G.8.3, MA.912.A.1.5, SC.912.N.1.1, SC.912.N.4.1, and SC.912.N.4.2

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| 32.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                | P-1 |
| 32.02 | Identify and interpret engine concern; determine necessary action.   | P-1 |
| 32.03 | Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 32.04 | Locate and interpret vehicle and major component identification numbers.   | P-1 |
| 32.05 | Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.   | P-1 |
| 32.06 | Diagnose engine noises and vibrations; determine necessary action.   | P-2 |
| 32.07 | Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action.                               | P-2 |
| 32.08 | Perform engine vacuum tests; determine necessary action.   | P-1 |
| 32.09 | Perform cylinder power balance tests; determine necessary action.  | P-2 |
| 32.10 | Perform cylinder cranking and running compression tests; determine necessary action.   | P-1 |
| 32.11 | Perform cylinder leakage tests; determine necessary action.  | P-1 |
| 32.12 | Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.                             | P-2 |
| 32.13 | Install engine covers using gaskets, seals and sealers as required.  | P-1 |
| 32.14 | Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.      | P-1 |
| 32.15 | Inspect, remove and replace engine mounts.   | P-2 |

33.0 Demonstrate proficiency in cylinder head and valve train diagnosis and repair –  
The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.A.2.2, MA.912.S.3.5, MA.912.A1.2, MA.912.A.1.4, MA.912.G.8.2, MA.912.G.6.2, MA.912.G.1.1, SC.912.N.1.1, SC.912.N.4.1, SC.912.N.4.2, MA.912.S.1.2, SC.912.P.12.3, and SC.912.P.10.3

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| 33.01 | Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.   | P-1 |
| 33.02 | Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.   | P-1 |
| 33.03 | Inspect valve springs for squareness and free height comparison; determine necessary action.   | P-3 |
| 33.04 | Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action.   | P-3 |
| 33.05 | Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.  | P-3 |
| 33.06 | Inspect valves and valve seats; determine necessary action.  | P-3 |
| 33.07 | Check valve spring assembled height and valve stem height; determine necessary action.   | P-3 |
| 33.08 | Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.   | P-2 |
| 33.09 | Inspect valve lifters; determine necessary action.   | P-2 |
| 33.10 | Adjust valves (mechanical or hydraulic lifters).   | P-1 |
| 33.11 | Inspect and replace camshaft and drive belt/chain (includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and variable valve timing components). | P-1 |
| 33.12 | Inspect and/or measure camshaft for runout, journal wear and lobe wear.  | P-2 |
| 33.13 | Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.  | P-2 |
| 33.14 | Establish camshaft position sensor indexing.   | P-1 |

34.0 Demonstrate proficiency in engine block diagnosis and repair –The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.G.1.1, MA.912.G.6.2, MA.912.G.7.5, MA.912.G.7.7, MA.912.S.3.5, MA.912.S.3.4, MA.912.S.1.2, SC.912.E.6.6, SC.912.L.17.15, SC.912.N.1.1, SC.912.N.4.1, and SC.912.N.4.2

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| 34.01 | Disassemble engine block; clean and prepare components for inspection and reassembly.  | P-1 |
| 34.02 | Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.  | P-2 |
| 34.03 | Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.   | P-2 |
| 34.04 | Deglaze and clean cylinder walls.  | P-2 |
| 34.05 | Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.   | P-3 |
| 34.06 | Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine |     |

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|       | necessary action.  | P-1 |
| 34.07 | Inspect main and connecting rod bearings for damage and wear; determine necessary action.  | P-2 |
| 34.08 | Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.   | P-3 |
| 34.09 | Inspect and measure piston skirts and ring lands; determine necessary action.  | P-2 |
| 34.10 | Remove and replace piston pin.   | P-3 |
| 34.11 | Determine piston-to-bore clearance.  | P-2 |
| 34.12 | Inspect, measure, and install piston rings.  | P-2 |
| 34.13 | Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance or silencer); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.  | P-2 |
| 34.14 | Remove, inspect or replace crankshaft vibration damper (harmonic balancer).  | P-2 |
| 34.15 | Assemble engine block.   | P-1 |
| 35.0  | <u>Demonstrate proficiency in lubrication and cooling systems diagnosis and repairs</u> –<br>The student will be able to:  |     |
|       | This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.A.3.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.G.7.5, MA.912.G.7.7, SC.912.P.8.2, SC.912.P.8.8, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.8.1, and SC.912.P.10.4 |     |
| 35.01 | Perform oil pressure tests; determine necessary action.  | P-1 |
| 35.02 | Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.  | P-2 |
| 35.03 | Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; determine necessary action.   | P-1 |
| 35.04 | Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.  | P-1 |
| 35.05 | Inspect and replace engine cooling and heater system hoses.  | P-1 |
| 35.06 | Inspect, test, and replace thermostat and gasket/seal.   | P-1 |
| 35.07 | Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.  | P-1 |
| 35.08 | Inspect, remove and replace water pump.  | P-2 |
| 35.09 | Remove and replace radiator.   | P-2 |
| 35.10 | Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.  | P-1 |
| 35.11 | Inspect auxiliary coolers; determine necessary action.   | P-3 |
| 35.12 | Inspect, test, and replace oil temperature and pressure switches and sensors.  | P-2 |
| 35.13 | Perform oil and filter change.   | P-1 |
| 35.14 | Identify causes of engine overheating.   | P-1 |

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 4  
**Course Number:** 8709440  
**Course Credit:** 1

**Course Description:**

51.0 Demonstrate proficiency in the operation, diagnosis and servicing of automatic transmission/transaxle. --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.P.12.2, SC.912.P.12.6, SC.912.P.12.3, SC.912.P.12.10, SC.912.N.4.1, SC.912.N.4.2, SC.912.N.1.1, SC.912.P.10.4, SC.912.P.8.2, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.10.16

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| 51.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.  | P-1 |
| 51.02 | Identify and interpret transmission/transaxle concern; differentiate between engine performance and transmission/transaxle concerns; determine necessary action.                                 | P-1 |
| 51.03 | Research applicable vehicle and service information, such as transmission/transaxle system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 51.04 | Locate and interpret vehicle and major component identification numbers.   | P-1 |
| 51.05 | Diagnose fluid loss and condition concerns; check fluid level in transmissions with and without dip-stick; determine necessary action.   | P-1 |
| 51.06 | Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.   | P-1 |
| 51.07 | Perform stall test; determine necessary action.  | P-3 |
| 51.08 | Perform lock-up converter system tests; determine necessary action.  | P-3 |
| 51.09 | Diagnose noise and vibration concerns; determine necessary action.   | P-2 |
| 51.10 | Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.   | P-1 |
| 51.11 | Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).  | P-2 |
| 51.12 | Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.   | P-1 |
- 52.0 Use information technology tools. -- The students will be able to:
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| 52.01 | Use personal information management (PIM) applications to increase workplace efficiency.  | IT 1.0 |
| 52.02 | Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. | IT 2.0 |

- 52.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 52.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 53.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 53.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 53.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 53.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 53.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 54.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 54.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 54.02 Describe the effect of money management on personal and career goals. FL 3.0
- 54.03 Develop a personal budget and financial goals. FL3.1
- 54.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 54.05 Maintain financial records. FL3.3
- 54.06 Read and reconcile financial statements. FL3.4
- 54.07 Research, compare and contrast investment opportunities.
- 55.0 Demonstrate proficiency in transmission/transaxle maintenance, adjustment and in-vehicle transmission/transaxle repair --The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.1.1, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, and MA.912.S.1.2
- 55.01 Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch. P-2
- 55.02 Inspect and replace external seals, gaskets, and bushings. P-2
- 55.03 Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses. P-1
- 55.04 Diagnose electronic transmission control systems using a scan tool; determine necessary action. P-1
- 55.05 Inspect, replace, and align powertrain mounts. P-2
- 55.06 Service transmission; perform visual inspection; replace fluid and filters. P-1
- 56.0 Demonstrate proficiency in off-vehicle transmission/transaxle repair (removal, disassembly, and reinstallation), oil pump and converter--the student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.P.12.3, SC.912.P.12.2, SC.912.P.12.10, MA912.S.1.2, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.3, SC.912.P.10.1, SC.912.P.10.2

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| 56.01 | Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces.          | P-1 |
| 56.02 | Disassemble, clean, and inspect transmission/transaxle.   | P-1 |
| 56.03 | Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets). | P-2 |
| 56.04 | Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action.  | P2  |
| 56.05 | Assemble transmission/transaxle.  | P-1 |
| 56.06 | Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.  | P-1 |
| 56.07 | Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.               | P-2 |
| 56.08 | Install and seat torque converter to engage drive/splines.  | P-1 |
| 56.09 | Inspect, measure, and reseal oil pump assembly and components.  | P-1 |
| 56.10 | Measure transmission/transaxle end play or preload; determine necessary action.   | P-1 |
| 56.11 | Inspect, measure, and replace thrust washers and bearings.  | P-2 |
| 56.12 | Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.                                   | P-2 |
- 57.0 Demonstrate proficiency in gear train, shafts, bushings, case, friction units and reaction units --The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.1.1, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.6, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.10.13, SC.912.P.10.14, and SC.912.P.10.15
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| 57.01 | Inspect bushings; determine necessary action.  | P-2 |
| 57.02 | Inspect and measure planetary gear assembly components; determine necessary action.  | P-2 |
| 57.03 | Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action.                                    | P-2 |
| 57.04 | Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.                          | P-2 |
| 57.05 | Inspect, measure, repair, adjust or replace transaxle final drive components.  | P-2 |
| 57.06 | Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action. | P-2 |
| 57.07 | Measure clutch pack clearance; determine necessary action.   | P-1 |
| 57.08 | Air test operation of clutch and servo assemblies.   | P-1 |
| 57.09 | Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; determine necessary action.                | P-1 |
| 57.10 | Inspect bands and drums; determine necessary action.   | P-2 |
| 57.11 | Describe the operational characteristics of a continuously variable transmission (CVT)   | P-3 |

57.12 Describe the operational characteristics of a hybrid vehicle drive train. P-3



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 5  
**Course Number:** 8709450  
**Course Credit:** 1

**Course Description:**

44.0 Demonstrate proficiency in general drive train diagnosis, clutch diagnosis and repair –  
 The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.E.6.6, SC.912.L.17.15, SC.912.N.4.1, SC.912.N.4.2, SC.912.N.1.4, SC.912.P.10.3, SC.912.P.12.3, SC.912.P.12.2, SC.912.P.12.6, SC.912.P.10.1, SC.912.P.10.2, and MA912.S.1.2

- 44.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
- 44.02 Identify and interpret drive train concern; determine necessary action. P-1
- 44.03 Research applicable vehicle and service information, such as drive train system operation, fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
- 44.04 Locate and interpret vehicle and major component identification numbers. P-1
- 44.05 Diagnose fluid loss, level, and condition concerns; determine necessary action. P-1
- 44.06 Drain and fill manual transmission/transaxle and final drive unit. P-1
- 44.07 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action. P-1
- 44.08 Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. P-1
- 44.09 Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action. P-1
- 44.10 Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable). P-1
- 44.11 Bleed clutch hydraulic system. P-1
- 44.12 Inspect flywheel and ring gear for wear and cracks; determine necessary action. P-1
- 44.13 Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action. P-1
- 44.14 Measure flywheel runout and crankshaft end play; determine necessary action. P-2

45.0 Demonstrate proficiency in transmission & transaxle diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.10.16

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| 45.01 | Remove and reinstall transmission/transaxle.   | P-1    |
| 45.02 | Disassemble, clean, and reassemble transmission/transaxle components.  | P-1    |
| 45.03 | Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.  | P-2    |
| 45.04 | Diagnose noise concerns using transmission/transaxle powerflow principles.   | P-2    |
| 45.05 | Diagnose hard shifting and jumping out of gear concerns; determine necessary action.   | P-2    |
| 45.06 | Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.   | P-2    |
| 45.07 | Inspect, replace, and align powertrain mounts.   | P-2    |
| 45.08 | Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.  | P-2    |
| 45.09 | Remove and replace transaxle final drive.  | P-3    |
| 45.10 | Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.   | P-2    |
| 45.11 | Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.   | P-1    |
| 45.12 | Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.   | P-1    |
| 45.13 | Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.  | P-3    |
| 45.14 | Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.         | P-3    |
| 45.15 | Inspect lubrication devices (oil pump or slingers); perform necessary action.  | P-3    |
| 45.16 | Inspect, test, and replace transmission/transaxle sensors and switches.  | P-2    |
| 45.17 | Describe the operational characteristics of an electronically controlled manual transmission/transaxle.  | P-3    |
| 46.0  | <u>Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.</u> -- The students will be able to: |        |
| 46.01 | Describe the nature and types of business organizations.   | SY 1.0 |
| 46.02 | Explain the effect of key organizational systems on performance and quality.   |        |
| 46.03 | List and describe quality control systems and/or practices common to the workplace.  | SY 2.0 |
| 46.04 | Explain the impact of the global economy on business organizations.  |        |
| 47.0  | <u>Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.</u> -- The students will be able to:   |        |
| 47.01 | Employ leadership skills to accomplish organizational goals and objectives.  | LT1.0  |
| 47.02 | Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.  | LT3.0  |

- 47.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 47.04 Employ mentoring skills to inspire and teach others. LT 5.0

48.0 Demonstrate proficiency in drive and half shaft universal and constant-velocity (CV) joint diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.2, SC.912.P.12.3, and MA.912.S.1.2

- 48.01 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action. P-1
- 48.02 Diagnose universal joint noise and vibration concerns; perform necessary action. P-2
- 48.03 Remove and replace front wheel drive (FWD) front wheel bearing (hub bearing). P-1
- 48.04 Inspect, service, and replace shafts, yokes, boots, and CV joints. P-1
- 48.05 Inspect, service, and replace shaft center support bearings. P-3
- 48.06 Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles. P-2

49.0 Demonstrate proficiency in rear axle diagnosis and repair; ring and pinion gears, differential case assembly and limited slip differential –The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.S.1.2, SC.912.P.12.2, SC.912.P.12.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.6, SC.912.P.10.3, SC.912.E.6.6, and SC.912.L.17.15

- 49.01 Diagnose noise and vibration concerns; determine necessary action. P-2
- 49.02 Diagnose fluid leakage concerns; determine necessary action. P-1
- 49.03 Inspect and replace companion flange and pinion seal; measure companion flange runout. P-2
- 49.04 Inspect ring gear and measure runout; determine necessary action. P-2
- 49.05 Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. P-2
- 49.06 Measure and adjust drive pinion depth. P-2
- 49.07 Measure and adjust drive pinion bearing preload. P-2
- 49.08 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). P-2
- 49.09 Check ring and pinion tooth contact patterns; perform necessary action. P-1
- 49.10 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. P-2
- 49.11 Reassemble and reinstall differential case assembly; measure runout; determine necessary action. P-2
- 49.12 Diagnose limited slip differential noise, slippage, and chatter concerns; determine necessary action. P-3
- 49.13 Clean and inspect differential housing; refill with correct lubricant and/or

- additive. P-2
- 49.14 Inspect and reinstall limited slip differential components. P-3
- 49.15 Measure rotating torque; determine necessary action. P-3
- 49.16 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. P-2
- 49.17 Inspect and replace drive axle shaft wheel studs. P-1
- 49.18 Remove and replace drive axle shafts. P-1
- 49.19 Inspect and replace drive axle shaft seals, bearings, and retainers. P-2
- 49.20 Measure drive axle flange runout and shaft end play; determine necessary action. P-2

50.0 Demonstrate proficiency in drive axle shaft and four-wheel drive/all-wheel drive component diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.A.3.1, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.10.1, and SC.912.P.10.2

- 50.01 Diagnose noise, vibration, and unusual steering concerns; determine necessary action. P-3
- 50.02 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. P-3
- 50.03 Remove and reinstall transfer case. P-3
- 50.04 Disassemble, service, and reassemble transfer case and components. P-3
- 50.05 Inspect front-wheel bearings and locking hubs; perform necessary action. P-3
- 50.06 Check drive assembly seals and vents; check lube level. P-3
- 50.07 Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems. P-3
- 50.08 Identify concerns related to variations in tire circumference and/or final drive ratios. P-3

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 6  
**Course Number:** 8709460  
**Course Credit:** 1

**Course Description:**

09.0 Demonstrate proficiency in general suspension and steering system diagnosis–  
 The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.4.1, SC.912.N.4.2, and SC.912.N.1.4

- 09.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
- 09.02 Identify and interpret suspension and steering system concerns; determine necessary action. P-1
- 09.03 Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. P-1
- 09.04 Locate and interpret vehicle and major component identification numbers. P-1

10.0 Demonstrate proficiency in suspension systems diagnosis and repair; front suspensions –  
 The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.4.1, SC.912.N.4.2, and SC.912.P.10.1

- 10.01 Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
- 10.02 Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action. P-1
- 10.03 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-2
- 10.04 Remove, inspect and install strut rods and bushings. P-2
- 10.05 Remove, inspect, and install upper and/or lower ball joints. P-1
- 10.06 Remove, inspect, and install steering knuckle assemblies. P-2
- 10.07 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-3
- 10.08 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3
- 10.09 Remove, inspect, and install stabilizer bar bushings, brackets, and links. P-2
- 10.10 Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. P-1
- 10.11 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3

11.0 Demonstrate proficiency in steering systems diagnosis and repair; rear suspensions, wheel alignment diagnosis, adjustment, repair and miscellaneous service --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.P.12.10, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.12.3, SC.912.P.12.2, SC.912.P.12.5, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, and MA.912.S.1.2

- 11.01 Disable and enable supplemental restraint system (SRS). P-1
- 11.02 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). P-1
- 11.03 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action. P-2
- 11.04 Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action. P-2
- 11.05 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action. P-2
- 11.06 Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. P-2
- 11.07 Adjust non-rack and pinion worm bearing preload and sector lash. P-3
- 11.08 Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets. P-2
- 11.09 Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-2
- 11.10 Determine proper power steering fluid type; inspect fluid level and condition. P-1
- 11.11 Flush, fill, and bleed power steering system. P-2
- 11.12 Diagnose power steering fluid leakage; determine necessary action. P-2
- 11.13 Remove, inspect, replace, and adjust power steering pump belt. P-1
- 11.14 Remove and reinstall power steering pump. P-2
- 11.15 Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment. P-2
- 11.16 Inspect and replace power steering hoses and fittings. P-2
- 11.17 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. P-2
- 11.18 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. P-1
- 11.19 Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action. P-3
- 11.20 Inspect and test electric power assist steering. P-3
- 11.21 Identify hybrid vehicle power steering system electrical circuits, service and safety precautions. P-3

12.0 Demonstrate proficiency in wheel and tire diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.G.1.1, SC.912.N.1.4, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.10, SC.912.P.10.3, SC.912.P.8.2, SC.912.P.8.8, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.10.18, and MA.912.S.1.2

- 12.01 Inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action.
- 12.02 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
- 12.03 Rotate tires according to manufacturer's recommendations.
- 12.04 Measure wheel, tire, axle flange, and hub runout; determine necessary action.
- 12.05 Diagnose tire pull problems; determine necessary action.
- 12.06 Dismount, inspect, and remount tire on wheel; Balance wheel and tire assembly (static and dynamic).
- 12.07 Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
- 12.08 Reinstall wheel; torque lug nuts.
- 12.09 Inspect tire and wheel assembly for air loss; perform necessary action.
- 12.10 Repair tire using internal patch.
- 12.11 Inspect, diagnose, and calibrate tire pressure monitoring system.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 7  
**Course Number:** 8709470  
**Course Credit:** 1

**Course Description:**

03.0 Demonstrate proficiency in the operation and servicing of automotive brake systems-  
 -The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.10, SC.912.P.10.3, SC.912.P.10.14, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.2, SC.912.P.12.3, SC.912.N.1.4, SC.912.P.8.2, SC.912.P.8.8, and MA.912.S.1.2

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| 03.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                    | P-1 |
| 03.02 | Identify and interpret brake system concern; determine necessary action.   | P-1 |
| 03.03 | Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.        | P-1 |
| 03.04 | Locate and interpret vehicle and major component identification numbers.   | P-1 |
| 03.05 | Diagnose pressure concerns in the brake system using hydraulic principles  |     |
| 03.06 | (Pascal's Law).  | P-1 |
| 03.07 | Measure brake pedal height, travel, and free play (as applicable); determine necessary action.   | P-1 |
| 03.08 | Check master cylinder for internal/external leaks and proper operation; determine necessary action.  | P-1 |
| 03.09 | Remove, bench bleed, and reinstall master cylinder.  | P-1 |
| 03.10 | Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.   | P-2 |
| 03.11 | Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. | P-1 |
| 03.12 | Replace brake lines, hoses, fittings, and supports.  | P-2 |
| 03.13 | Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).   | P-2 |
| 03.14 | Select, handle, store, and fill brake fluids to proper level.  | P-1 |
| 03.15 | Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.   | P-3 |
| 03.16 | Inspect, test, and/or replace components of brake warning light system.  | P-3 |
| 03.17 | Bleed and/or flush brake system.   | P-1 |



- 03.18 Test brake fluid for contamination. P-1
- 04.0 Demonstrate proficiency in drum brake diagnosis and repair --the student will be able to:  
This standard supports the following Sunshine State Standards: SC.912.P12.2, SC.912.P.12.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.10, SC.912.P.10.3, MA.912.S.1.2, SC.912.E.6.6, and SC.912.L.17.15
- 04.01 Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1
- 04.02 Remove, clean, inspect, and measure brake drums; determine necessary action. P-1
- 04.03 Refinish brake drum; measure final drum diameter. P-1
- 04.04 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-1
- 04.05 Inspect and install wheel cylinders. P-2
- 04.06 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings. P-2
- 04.07 Install wheel, torque lug nuts, and make final checks and adjustments. P-1
- 05.0 Demonstrate proficiency in the operation of disc brake diagnosis and repair--The student will be able to:  
This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.P12.2, SC.912.P.12.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.10, SC.912.P.10.3, MA.912.S.1.2, SC.912.E.6.6, and SC.912.L.17.15
- 05.01 Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action. P-1
- 05.02 Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action. P-1
- 05.03 Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action. P-1
- 05.04 Remove, inspect and replace pads and retaining hardware; determine necessary action. P-1
- 05.05 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. P-3
- 05.06 Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. P-1
- 05.07 Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action P-1
- 05.08 Remove and reinstall rotor. P-1
- 05.09 Refinish rotor on vehicle; measure final rotor thickness. P-1
- 05.10 Refinish rotor off vehicle; measure final rotor thickness. P-1
- 05.11 Retract caliper piston on an integrated parking brake system. P-3
- 05.12 Install wheel, torque lug nuts, and make final checks and adjustments. P-1
- 05.13 Check brake pad wear indicator system operation; determine necessary action. P-2
- 06.0 Demonstrate proficiency in the operation of power assist units diagnosis and repair--The

student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.P.10.3, SC.912.N.4.1, SC.912.N.4.2, and SC.912.P.12.10

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| 06.01 | Test pedal free travel; check power assist operation.   | P-2 |
| 06.02 | Check vacuum supply to vacuum-type power booster.   | P-1 |
| 06.03 | Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action. | P-1 |
| 06.04 | Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.          | P-3 |
| 06.05 | Measure and adjust master cylinder pushrod length.  | P-3 |

07.0 Demonstrate proficiency in miscellaneous (wheel bearings, parking brakes, electrical, etc.) diagnosis and repair--The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.8.8, SC.912.P.10.14, SC.912.P.10.15, SC.912.E.6.6, and SC.912.L.17.15

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| 07.01 | Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.                           | P-1 |
| 07.02 | Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.             | P-1 |
| 07.03 | Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed. | P-2 |
| 07.04 | Check parking brake and indicator light system operation; determine necessary action.                                      | P-1 |
| 07.05 | Check operation of brake stop light system; determine necessary action.  | P-1 |
| 07.06 | Replace wheel bearing and race.  | P-2 |
| 07.07 | Inspect and replace wheel studs.   | P-1 |
| 07.08 | Remove and reinstall sealed wheel bearing assembly.  | P-1 |

08.0 Demonstrate proficiency in electronic brake, traction and stability control systems diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.10.3, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.1, SC.912.P.10.2, and SC.912.P.10.4

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| 08.01 | Identify and inspect electronic brake control system components; determine necessary action.   |
| 08.02 | Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.     |
| 08.03 | Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action. |

- 08.04 Depressurize high-pressure components of the electronic brake control system.
- 08.05 Bleed the electronic brake control system hydraulic circuits.
- 08.06 Remove and install electronic brake control system electrical/electronic and hydraulic components.
- 08.07 Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).
- 08.08 Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).
- 08.09 Identify traction control/vehicle stability control system components.
- 08.10 Describe the operation of a regenerative braking system.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 8  
**Course Number:** 8709480  
**Course Credit:** 1

**Course Description:**

13.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components related to power train--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.N.4.1, SC.912.N.4.2, SC.912.N.1.4, SC.912.P.10.13, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.8.2, and SC.912.P.8.8

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| 13.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                             | P-1 |
| 13.02 | Identify and interpret electrical/electronic system concern; determine necessary action.  | P-1 |
| 13.03 | Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 13.04 | Locate and interpret vehicle and major component identification numbers.  | P-1 |
| 13.05 | Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).  | P-1 |
| 13.06 | Use wiring diagrams during diagnosis of electrical circuit problems.  | P-1 |
| 13.07 | Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance.    | P-1 |
| 13.08 | Check electrical circuits with a test light; determine necessary action.  | P-2 |
| 13.09 | Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.   | P-2 |
| 13.10 | Check electrical circuits using fused jumper wires; determine necessary action.   | P-2 |
| 13.11 | Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.   | P-1 |
| 13.12 | Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.  | P-1 |
| 13.13 | Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.  | P-1 |
| 13.14 | Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.                                 | P-1 |
| 13.15 | Remove and replace terminal end from connector; replace connectors and terminal ends.   | P-1 |

- 13.16 Repair wiring harness (including CAN/BUS systems). P-1
- 13.17 Perform solder repair of electrical wiring. P-1
- 13.18 Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures P-2

14.0 Demonstrate proficiency in battery diagnosis and service --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.P.8.2, SC.912.P.8.8, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.13, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.10.16

- 14.01 Perform battery state-of-charge test; determine necessary action. P-1
- 14.02 Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. P-1
- 14.03 Maintain or restore electronic memory functions. P-1
- 14.04 Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs. P-1
- 14.05 Perform battery charge. P-1
- 14.06 Start a vehicle using jumper cables or an auxiliary power supply. P-1
- 14.07 Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions. P-3
- 14.08 Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect. P-1
- 14.09 Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures. P-3

15.0 Demonstrate proficiency in starting system diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.8.2, SC.912.P.8.8, SC.912.P.10.13, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.10.16

- 15.01 Perform starter current draw tests; determine necessary action. P-1
- 15.02 Perform starter circuit voltage drop tests; determine necessary action. P-1
- 15.03 Inspect and test starter relays and solenoids; determine necessary action. P-2
- 15.04 Remove and install starter in a vehicle. P-1
- 15.05 Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action. P-2
- 15.06 Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition. P-2

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 9  
**Course Number:** 8709490  
**Course Credit:** 1

**Course Description:**

16.0 Demonstrate proficiency in charging system diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.P.10.13, SC.912.P.10.16, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.12.2, and SC.912.P.10.3

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| 16.01 | Perform charging system output test; determine necessary action.  | P-1 |
| 16.02 | Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.                              | P-1 |
| 16.03 | Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment. | P-1 |
| 16.04 | Remove, inspect, and install generator (alternator).  | P-1 |
| 16.05 | Perform charging circuit voltage drop tests; determine necessary action.  | P-1 |

17.0 Demonstrate proficiency in lighting systems, gauges, warning devices, and driver information systems diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.13, SC.912.P.10.14, and SC.912.P.10.15

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| 17.01 | Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.              | P-1 |
| 17.02 | Inspect, replace, and aim headlights and bulbs.  | P-2 |
| 17.03 | Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.                                | P-2 |
| 17.04 | Identify system voltage and safety precautions associated with high intensity discharge headlights.                            | P-2 |
| 17.05 | Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.              | P-1 |
| 17.06 | Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.                  | P-3 |
| 17.07 | Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. | P-1 |
| 17.08 | Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.       | P-3 |

18.0 Demonstrate proficiency in horn and wiper/washer and accessories diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, SC.912.N.4.1, SC.912.N.4.2, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.17, SC.912.P.10.18, MA912.S.1.2, SC.912.P.12.10, SC.912.P.8.2, SC.912.P.8.8, SC.912.P.12.2, SC.912.P.12.3, and SC.912.P.10.13

- 18.01 Diagnose incorrect horn operation; perform necessary action. P-1
- 18.02 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-1
- 18.03 Diagnose incorrect washer operation; perform necessary action. P-2
- 18.04 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. P-1
- 18.05 Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. P-3
- 18.06 Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action. P-1
- 18.07 Diagnose incorrect operation of cruise control systems; determine necessary action. P-3
- 18.08 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. P-1
- 18.09 Disarm and enable the airbag system for vehicle service. P-1
- 18.10 Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action. P-3
- 18.11 Remove and reinstall door panel. P-1
- 18.12 Diagnose body electronic system circuits using a scan tool; determine necessary action. P-2
- 18.13 Check for module communication (including CAN/BUS systems) errors using a scan tool. P-2
- 18.14 Diagnose the cause of false, intermittent, or no operation of anti-theft systems. P-3
- 18.15 Describe the operation of keyless entry/remote-start systems. P-3
- 18.16 Perform software transfers, software updates, or flash reprogramming on electronic modules. P-3

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 10  
**Course Number:** 8709491  
**Course Credit:** 1

**Course Description:**

39.0 Demonstrate proficiency in A/C system diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.4.1, SC.912.N.4.2, SC.912.N.1.4, SC.912.P.12.10, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.10.4, SC.912.P.10.5, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.12.3

- 39.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1
- 39.02 Identify and interpret heating and air conditioning concern; determine necessary action. P-1
- 39.03 Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins. P-1
- 39.04 Locate and interpret vehicle and major component identification numbers. P-1
- 39.05 Performance test A/C system; identify A/C system malfunctions. P-1
- 39.06 Identify abnormal operating noises in the A/C system; determine necessary action. P-2
- 39.07 Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings. P-1
- 39.08 Leak test A/C system; determine necessary action. P-1
- 39.09 Inspect the condition of refrigerant oil removed from the system; determine necessary action. P-2
- 39.10 Determine recommended oil and oil capacity for system application. P-1
- 39.11 Using scan tool, observe and record related HVAC data and trouble codes. P-1

40.0 Demonstrate proficiency in refrigeration system component diagnosis and repair of compressor, compressor clutch, evaporator, receiver/drier, condenser, etc. -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.D.11.4, MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.3, SC.912.P.10.14, and SC.912.P.10.15

- 40.01 Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. P-2



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| 40.02 | Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.                                   | P-1 |
| 40.03 | Inspect, test, and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap and adjust as needed.. | P-2 |
| 40.04 | Remove, inspect, and reinstall A/C compressor and mountings; determine required oil quantity.  | P-1 |
| 40.05 | Identify hybrid vehicle A/C system electrical circuits, service and safety precautions.  | P-3 |
| 40.06 | Determine the need for an additional A/C system filter; perform necessary action.  | P-3 |
| 40.07 | Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.          | P-2 |
| 40.08 | Inspect A/C condenser for airflow restrictions; perform necessary action.  | P-1 |
| 40.09 | Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity.                                   | P-1 |
| 40.10 | Remove, inspect, and install expansion valve or orifice (expansion) tube.  | P-1 |
| 40.11 | Inspect evaporator housing water drain; perform necessary action.  | P-2 |
| 40.12 | Remove, inspect, and reinstall evaporator; determine required oil quantity.  | P-3 |
| 40.13 | Remove, inspect, and reinstall condenser; determine required oil quantity.   | P-3 |
- 41.0 Demonstrate proficiency in heating and engine cooling systems diagnosis and repair  
--The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.S.3.4 MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4 MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.4, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.12.10, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.12.3, and SC.912.P.10.3
- |       |   |     |
|-------|---|-----|
| 41.01 | Diagnose temperature control problems in the heater/ventilation system; determine necessary action.   | P-2 |
| 41.02 | Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. | P-1 |
| 41.03 | Inspect engine cooling and heater system hoses and belts; perform necessary action.   | P-1 |
| 41.04 | Inspect, test, and replace thermostat and gasket/seal.  | P-1 |
| 41.05 | Determine coolant condition and coolant type for vehicle application; drain and recover coolant.  | P-1 |
| 41.06 | Flush system; refill system with recommended coolant; bleed system.   | P-2 |
| 41.07 | Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.   | P-1 |
| 41.08 | Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.   | P-1 |
| 41.09 | Inspect and test heater control valve(s); perform necessary action.   | P-2 |
| 41.10 | Remove, inspect, and reinstall heater core.   | P-3 |
- 42.0 Demonstrate proficiency in A/C operating systems and related controls diagnosis and repairs --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.4 MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4 MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.3, SC.912.P.10.14, and SC.912.P.10.15

- 42.01 Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. P-2
- 42.02 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action. P-1
- 42.03 Test and diagnose A/C compressor clutch control systems; determine necessary action. P-1
- 42.04 Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. P-2
- 42.05 Inspect and test A/C-heater control panel assembly; determine necessary action. P-3
- 42.06 Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action. P-3
- 42.07 Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action. P-2
- 42.08 Identify the source of A/C system odors. P-2
- 42.09 Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. P-2

43.0 Demonstrate proficiency in refrigerant recovery, recycling, and handling --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.4.1, SC.912.N.4.2, SC.912.E.6.6, and SC.912.L.17.15

- 43.01 Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards. P-1
- 43.02 Identify and recover A/C system refrigerant. P-1
- 43.03 Recycle, label, and store refrigerant. P-1
- 43.04 Evacuate and charge A/C system; add refrigerant oil as required. P-1

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 11  
**Course Number:** 8709492  
**Course Credit:** 1

**Course Description:**

19.0 Demonstrate proficiency in general engine diagnosis--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.4, MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4, MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.N.1.4, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.10.4, SC.912.P.10.5, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.8.8, SC.912.P.12.2, SC.912.P.12.3, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.10, and SC.912.P.12.12

- |       |   |     |
|-------|---|-----|
| 19.01 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.                         | P-1 |
| 19.02 | Identify and interpret engine performance concern; determine necessary action.  | P-1 |
| 19.03 | Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
| 19.04 | Locate and interpret vehicle and major component identification numbers.  | P-1 |
| 19.05 | Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.  | P-2 |
| 19.06 | Diagnose abnormal engine noise or vibration concerns; determine necessary action.   | P-3 |
| 19.07 | Diagnose abnormal exhaust color, odor, and sound; determine necessary action.   | P-2 |
| 19.08 | Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.   | P-1 |
| 19.09 | Perform cylinder power balance test; determine necessary action.  | P-2 |
| 19.10 | Perform cylinder cranking and running compression tests; determine necessary action.  | P-1 |
| 19.11 | Perform cylinder leakage test; determine necessary action.  | P-1 |
| 19.12 | Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.  | P-1 |
| 19.13 | Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.                             | P-3 |
| 19.14 | Verify engine operating temperature; determine necessary action.  | P-1 |
| 19.15 | Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.            | P-1 |
| 19.16 | Verify correct camshaft timing.   | P-1 |

20.0 Demonstrate proficiency in computerized engine controls diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.4, MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4, MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.12, SC.912.P.8.2, and SC.912.P.8.8

- 20.01 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. P-1
- 20.02 Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data. P-1
- 20.03 Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action. P-1
- 20.04 Check for module communication (including CAN/BUS systems) errors using a scan tool. P-2
- 20.05 Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action. P-1
- 20.06 Access and use service information to perform step-by-step diagnosis. P-1
- 20.07 Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action. P-3
- 20.08 Perform active tests of actuators using a scan tool; determine necessary action. P-1
- 20.09 Describe the importance of running all OBDII monitors for repair verification. P-1

21.0 Demonstrate proficiency in ignition system diagnosis and repair--The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.4, MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4, MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.8.2, SC.912.P.8.8, SC.912.P.12.2, and SC.912.P.12.3

- 21.01 Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action. P-1
- 21.02 Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. P-1
- 21.03 Inspect and test crankshaft and camshaft position sensor(s); perform necessary action. P-1
- 21.04 Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary. P-2

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Service Technology 12  
**Course Number:** 8709493  
**Course Credit:** 1

**Course Description:**

22.0 Demonstrate proficiency in fuel, air induction and exhaust systems diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.4 MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4 MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.N.1.4, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.10.4, SC.912.P.10.5, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.8.8, SC.912.P.12.2, SC.912.P.12.3, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.10, SC.912.P.12.12, SC.912.P.10.14, and SC.912.P.10.15

- 22.01 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action. P-1
- 22.02 Check fuel for contaminants and quality; determine necessary action. P-2
- 22.03 Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action. P-1
- 22.04 Replace fuel filters. P-2
- 22.05 Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. P-2
- 22.06 Inspect and test fuel injectors. P-1
- 22.07 Verify idle control operation. P-1
- 22.08 Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action. P-1
- 22.09 Perform exhaust system back-pressure test; determine necessary action. P-1
- 22.10 Test the operation of turbocharger/supercharger systems; determine necessary action P-3

23.0 Demonstrate proficiency in fuel, air induction, and positive crankcase ventilation repair. --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.S.3.4 MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4, MA.912.A.3.3, SC.912.E.6.6, SC.912.L.17.15, SC.912.N.4.1, SC.912.N.4.2, and SC.912.P.12.10

- 23.01 Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action. P-2
- 23.02 Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap,

- valve, tubes, orifices, and hoses; perform necessary action. P-2
- 23.03 Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action. P-1
- 24.0 Demonstrate proficiency in emissions controls systems --The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.S.3.4 MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4, MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.12.10, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.12.12, SC.912.P.8.2, and SC.912.P.8.8
- 24.01 Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. P-1
- 24.02 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. P-2
- 24.03 Diagnose emissions and driveability concerns caused by the secondary air injection and catalytic converter systems; determine necessary action. P-2
- 24.04 Inspect and test mechanical components of secondary air injection systems; perform necessary action. P-3
- 24.05 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. P-3
- 24.06 Inspect and test catalytic converter efficiency. P-1
- 24.07 Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action. P-1
- 24.08 Inspect and test components and hoses of the evaporative emissions control system; perform necessary action. P-1
- 24.09 Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action. P-1
- 25.0 Demonstrate proficiency in engine related service --The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.S.3.4 MA.912.S.3.5, MA.912.A.1.1, MA.912.D.11.4, MA.912.A.3.3, SC.912.N.4.1, SC.912.N.4.2, SC.912.P.10.3, SC.912.P.12.3, SC.912.P.10.4, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.12.2, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.8.2, SC.912.P.8.8, SC.912.E.6.6, and SC.912.L.17.15
- 25.01 Adjust valves on engines with mechanical or hydraulic lifters. P-1
- 25.02 Remove and replace timing belt; verify correct camshaft timing. P-1
- 25.03 Remove and replace thermostat and gasket/seal. P-1
- 25.04 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. P-1
- 25.05 Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert. P-1
- 25.06 Perform engine oil and filter change. P-1
- 25.07 Identify hybrid vehicle internal combustion engine service precautions. P-3

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Detailing and Reconditioning  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	8710000	I470623
CIP Number	0647060302	0647060302
Grade Level	9-12, 30, 31	30, 31
Standard Length	3 Credits	450 Hours
Teacher Certification	AUTO BODY @7 G AUTO IND @7 G AUTO MECH @7 G	AUTO BODY @7 G AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	53-7061	53-7061
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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 communication skills, leadership skills, human relations and employability skills, safe and efficient work practices.

## Program Structure

This program is a planned sequence of instruction consisting of three OCPs.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ARR0610	Basic Prep, Automotive	150	53-7061
B	ARR0611	Reconditioning Detailer	150	53-7061
C	ARR0612	Automobile Detailer	150	53-7061

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8710010	Automotive Detailing 1	1 Credit	53-7061	2
B	8710020	Automotive Detailing 2	1 Credit	53-7061	2
C	8710030	Automotive Detailing 3	1 Credit	53-7061	2

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all



career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If

needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Demonstrate shop and occupational safety skills.
- 02.0 Demonstrate proficiency in washing a vehicle.
- 03.0 Perform vehicle interior cleaning.
- 04.0 Demonstrate language arts knowledge and skills
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Demonstrate science knowledge and skills
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 08.0 Demonstrate proficiency in reconditioning vehicle paint surfaces.
- 09.0 Demonstrate proficiency in caring for vinyl tops.
- 10.0 Degrease and clean engine compartment.
- 11.0 Perform minor upholstery and vinyl repairs.
- 12.0 Solve problems using critical thinking skills, creativity and innovation.
- 13.0 Use information technology tools
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment

- 15.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 16.0 Demonstrate proficiency in applying vinyl pinstripes.
- 17.0 Demonstrate proficiency in applying window tint.
- 18.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 19.0 Describe the importance of professional ethics and legal responsibilities.
- 20.0 Explain the importance of employability and entrepreneurship skills
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Detailing and Reconditioning**  
**PSAV Number: I470623**

**Course Number: ARR0610**  
**Occupational Completion Point: A**  
**Basic Prep/Automotive – 150 Hours – SOC Code 53-7061**

- 01.0 Demonstrate shop and occupational safety skills--The student will be able to:
- 01.01 Apply shop safety rules and procedures.
  - 01.02 Comply with safety rules regarding chemicals.
  - 01.03 Comply with shop safety rules regarding hand tools and power equipment.
  - 01.04 Apply fire safety rules and procedures.
  - 01.05 Comply with EPA standards regarding use of and disposal of chemicals.
- 02.0 Demonstrate proficiency in washing a vehicle--The student will be able to:
- 02.01 Identify the proper supplies needed to wash a vehicle.
  - 02.02 Identify the correct sequence of washing a vehicle.
  - 02.03 Dry the vehicle.
  - 02.04 Inspect the finished vehicle.
- 03.0 Perform vehicle interior cleaning--The student will be able to:
- 03.01 Identify the proper supplies and chemicals needed to clean and protect a vehicle interior.
  - 03.02 Vacuum a vehicle interior.
  - 03.03 Shampoo and/or clean vehicle upholstery.
  - 03.04 Apply fabric guard chemicals.
  - 03.05 Apply vinyl dressing and preservative chemicals.
  - 03.06 Apply fabric-reconditioning dyes.
  - 03.07 Apply vinyl dyes.
- 04.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 04.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 04.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 04.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 05.03 Construct charts/tables/graphs using functions and data. AF3.5

- 06.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 06.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 06.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 07.02 Locate, organize and reference written information from various sources. CM 3.0
- 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 07.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 07.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: ARR0611****Occupational Completion Point: B****Reconditioning Detailer – 150 Hours – SOC Code 53-7061**

- 08.0 Demonstrate proficiency in reconditioning vehicle paint surfaces--The student will be able to:
- 08.01 Identify the proper supplies and chemicals needed to recondition vehicle paint surfaces.
- 08.02 Operate a power buffer.
- 08.03 Apply rubbing/buffing compound.
- 08.04 Remove heavy paint oxidation.
- 08.05 Apply polishing compounds.
- 08.06 Apply waxes, sealants, and polymers.
- 08.07 Apply touch-up paint.
- 09.0 Demonstrate proficiency in caring for vinyl tops--The student will be able to:
- 09.01 Identify the proper supplies and chemicals needed to care for vehicle vinyl tops.
- 09.02 Apply vinyl top cleaners.
- 09.03 Apply vinyl top dyes.
- 09.04 Apply vinyl top dressings.
- 10.0 Degrease and clean vehicle engine compartment--The student will be able to:
- 10.01 Identify the proper supplies and chemicals needed to clean and recondition vehicle engine compartment.
- 10.02 Operate a high-pressure washer.

- 10.03 Degrease engine and engine compartment.
  - 10.04 Select and apply correct color engine paint.
  - 10.05 Apply clear engine paint.
  - 10.06 Inspect belts and hoses.
- 11.0 Perform minor upholstery and vinyl repairs--The student will be able to:
- 11.01 Identify the supplies necessary to perform minor upholstery repair.
  - 11.02 Repair fabric upholstery.
  - 11.03 Repair vinyl seat upholstery.
  - 11.04 Repair vinyl dashboards.
- 12.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 12.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 13.0 Use information technology tools. -- The students will be able to:
- 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 14.01 Describe the nature and types of business organizations. SY 1.0
  - 14.02 Explain the effect of key organizational systems on performance and quality.
  - 14.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 14.04 Explain the impact of the global economy on business organizations.
- 15.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 15.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 15.02 Explain emergency procedures to follow in response to workplace accidents.
  - 15.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: ARR0612**  
**Occupational Completion Point: C**  
**Automobile Detailer – 150 Hours – SOC Code 53-7061**

- 16.0 Demonstrate proficiency in applying vinyl pinstripes--The student will be able to:
- 16.01 Identify the supplies and materials necessary to pinstripe a vehicle.
  - 16.02 Sketch a vehicle pinstripe layout.
  - 16.03 Apply pinstripes to a vehicle.
  - 16.04 Sketch a multi-color graphic design using vinyl material.
  - 16.05 Apply a vinyl multi-color graphic design to a vehicle.
- 17.0 Demonstrate proficiency in applying window tint--The student will be able to:
- 17.01 Identify the supplies and materials necessary to apply window tint to a vehicle.
  - 17.02 Comply with local and state regulations regarding application of window tint on motor vehicles.
  - 17.03 Apply window tint on flat glass surfaces.
  - 17.04 Apply window tint to curved glass surfaces.
- 18.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 18.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 18.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 18.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 18.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 19.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 19.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 19.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 19.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 19.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 20.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 20.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 20.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 20.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 20.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 20.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 20.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 20.07 Identify opportunities and research requirements for career advancement. ECD 8.0

- 20.08 Research the benefits of ongoing professional development. ECD 9.0
- 20.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
  - 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 21.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 21.03 Develop a personal budget and financial goals. FL3.1
  - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 21.05 Maintain financial records. FL3.3
  - 21.06 Read and reconcile financial statements. FL3.4
  - 21.07 Research, compare and contrast investment opportunities.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Detailing 1  
**Course Number:** 8710010  
**Course Credit:** 1 Credit

**Course Description:**

- 01.0 Demonstrate shop and occupational safety skills--The student will be able to:
- 01.01 Apply shop safety rules and procedures.
  - 01.02 Comply with safety rules regarding chemicals.
  - 01.03 Comply with shop safety rules regarding hand tools and power equipment.
  - 01.04 Apply fire safety rules and procedures.
  - 01.05 Comply with EPA standards regarding use of and disposal of chemicals.
- 02.0 Demonstrate proficiency in washing a vehicle--The student will be able to:
- 02.01 Identify the proper supplies needed to wash a vehicle.
  - 02.02 Identify the correct sequence of washing a vehicle.
  - 02.03 Dry the vehicle.
  - 02.04 Inspect the finished vehicle.
- 03.0 Perform vehicle interior cleaning--The student will be able to:
- 03.01 Identify the proper supplies and chemicals needed to clean and protect a vehicle interior.
  - 03.02 Vacuum a vehicle interior.
  - 03.03 Shampoo and/or clean vehicle upholstery.
  - 03.04 Apply fabric guard chemicals.
  - 03.05 Apply vinyl dressing and preservative chemicals.
  - 03.06 Apply fabric-reconditioning dyes.
  - 03.07 Apply vinyl dyes.
- 04.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 04.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 04.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 04.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 05.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0

- 06.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 06.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
  - 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 07.02 Locate, organize and reference written information from various sources. CM 3.0
  - 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 07.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 07.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Detailing 2  
**Course Number:** 8710020  
**Course Credit:** 1 Credit

**Course Description:**

08.0 Demonstrate proficiency in reconditioning vehicle paint surfaces--The student will be able to:

- 08.01 Identify the proper supplies and chemicals needed to recondition vehicle paint surfaces.
- 08.02 Operate a power buffer.
- 08.03 Apply rubbing/buffing compound.
- 08.04 Remove heavy paint oxidation.
- 08.05 Apply polishing compounds.
- 08.06 Apply waxes, sealants, and polymers.
- 08.07 Apply touch-up paint.

09.0 Demonstrate proficiency in caring for vinyl tops--The student will be able to:

- 09.01 Identify the proper supplies and chemicals needed to care for vehicle vinyl tops.
- 09.02 Apply vinyl top cleaners.
- 09.03 Apply vinyl top dyes.
- 09.04 Apply vinyl top dressings.

10.0 Degrease and clean vehicle engine compartment--The student will be able to:

- 10.01 Identify the proper supplies and chemicals needed to clean and recondition vehicle engine compartment.
- 10.02 Operate a high-pressure washer.
- 10.03 Degrease engine and engine compartment.
- 10.04 Select and apply correct color engine paint.
- 10.05 Apply clear engine paint.
- 10.06 Inspect belts and hoses.

11.0 Perform minor upholstery and vinyl repairs--The student will be able to:

- 11.01 Identify the supplies necessary to perform minor upholstery repair.
- 11.02 Repair fabric upholstery.
- 11.03 Repair vinyl seat upholstery.
- 11.04 Repair vinyl dashboards.

12.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

- 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions.

PS1.0

- 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 12.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 13.0 Use information technology tools. -- The students will be able to:
- 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 14.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 14.01 Describe the nature and types of business organizations. SY 1.0
- 14.02 Explain the effect of key organizational systems on performance and quality.
- 14.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 14.04 Explain the impact of the global economy on business organizations.
- 15.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 15.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 15.02 Explain emergency procedures to follow in response to workplace accidents.
- 15.03 Create a disaster and/or emergency response plan. SHE 2.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Automotive Detailing 3  
**Course Number:** 8710030  
**Course Credit:** 1 Credit

**Course Description:**

16.0 Demonstrate proficiency in applying vinyl pinstripes--The student will be able to:

- 16.01 Identify the supplies and materials necessary to pinstripe a vehicle.
- 16.02 Sketch a vehicle pinstripe layout.
- 16.03 Apply pinstripes to a vehicle.
- 16.04 Sketch a multi-color graphic design using vinyl material.
- 16.05 Apply a vinyl multi-color graphic design to a vehicle.

17.0 Demonstrate proficiency in applying window tint--The student will be able to:

- 17.01 Identify the supplies and materials necessary to apply window tint to a vehicle.
- 17.02 Comply with local and state regulations regarding application of window tint on motor vehicles.
- 17.03 Apply window tint on flat glass surfaces.
- 17.04 Apply window tint to curved glass surfaces.

18.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 18.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 18.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 18.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 18.04 Employ mentoring skills to inspire and teach others. LT 5.0

19.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 19.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 19.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 19.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 19.04 Interpret and explain written organizational policies and procedures. ELR 2.0

20.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 20.01 Identify and demonstrate positive work behaviors needed to be employable.ECD 1.0
- 20.02 Develop personal career plan that includes goals, objectives, and strategies.ECD 2.0

- 20.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 20.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 20.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 20.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 20.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 20.08 Research the benefits of ongoing professional development. ECD 9.0
  - 20.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 21.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 21.03 Develop a personal budget and financial goals. FL3.1
  - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 21.05 Maintain financial records. FL3.3
  - 21.06 Read and reconcile financial statements. FL3.4
  - 21.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Aircraft Airframe Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>Secondary</b>	<b>PSAV</b>
Program Number	<b>8715100</b>	<b>I470612</b>
CIP Number	0647060700	0647060700
Grade Level	9-12 30,31	30, 31
Standard Length	4 credits (General Only)	1,440 Hours
Teacher Certification	AIR MECH @7G	AIR MECH @7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3011	49-3011
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 10.0 Language: 9.0 Reading: 10.0

### **Purpose**

The purpose of this program is to prepare students for employment or advanced training in the commercial and general aviation industry. Instruction is designed to prepare students for Federal Aviation Administration (FAA) license examinations for Airframe ratings. Federal Aviation Regulation (FAR) Part 147 identifies minimum requirements for AMT schools. Any changes to the FAA-approved course content must be approved in advance. This program prepares students for employment as an Aviation General Maintenance Technician Helper, and an Aviation Maintenance Technician with FAA Airframe Rating.

This program focuses on broad, transferable skills, stresses understanding of all aspects of the aviation maintenance industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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.

### Program Structure

This program is a planned sequence of instruction consisting of a core and one OCP.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AMT0700	Aviation General Maintenance Technician Helper	480	49-3011
	AMT0710	Aviation Maintenance Technician with FAA Airframe Rating 1	480	49-3011
B	AMT0711	Aviation Maintenance Technician with FAA Airframe Rating 2	480	49-3011

The following table illustrates the **Secondary** program structure:

**Aviation Maintenance General** - 4 secondary credits (480 hours FAA required minimum). These courses may be used as part of "Powerplant" or "Airframe". The outcomes and student performance standards are the same as "General". The courses can be used only once for secondary students enrolled in either "Powerplant" or "Airframe".

The FAA required subject matter may be sequenced in courses 1 through 4 as necessary to meet program specific General requirements. The student will be provided with a transcript of the FAA completed requirements when he or she leaves/moves as proof of completion/competency. The total FAA approved General program may not extend beyond the number courses for the high school program.

Aviation Maintenance General Only

OCP	Course Number	Course Title	Length	SOC Code	Level
	8715110	Aviation Maintenance General 1	1 credit	49-3011	3
	8715120	Aviation Maintenance General 2	1 credit	49-3011	3
	8715130	Aviation Maintenance General 3	1 credit	49-3011	3
A	8715140	Aviation Maintenance General 4	1 credit	49-3011	3



## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Classroom, shop, and laboratory activities are an integral part of this program. FAR Section 147.21(e) requires teaching of at least 50 percent of the curriculum in the shop or laboratory. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes found in the industry. Equipment and supplies should be provided to enhance hands-on experiences for students in the chosen occupation.

## Special Notes

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Required FAA exams include GENERAL written, oral, and practical; AIRFRAME written, oral, and practical; and POWERPLANT written, oral, and practical. The only way a person can get authorization to take these examinations is to (1) graduate from an approved school or (2) obtain permission from the FAA to take the test based on prior experience on certified aircraft. Schools cannot grant permission (FAA FAR, Part 65 and Part 147, Subpart C 147.31).

Since an Aviation Maintenance Technician School (AMTS) is certified and inspected by the FAA, satisfaction of FAR Part 147 requirements should be the primary concern of an AMTS. When local and state educational requirements conflict with the FAA's regulation of an AMTS, those requirements must be resolved to satisfy FAR Part 147. In other words, FAA standards take precedence over other requirements. The FAA specifies minimum hours required and encourages schools to exceed minimum standards for the curriculum. The course content specified by the FAA may not be lowered.

"FAA FAR Part 147" identifies standards required by the FAA. Minimum teaching levels expected by the FAA also appear:

- Level 1:** knowledge of general principles
- Level 2:** knowledge of general principles and limited practical application
- Level 3:** knowledge of general principles with a high degree of practical application and hands-on skill levels according to FAA FAR Part 147: For subjects taught at Level 3, all special tools required to meet "return to service" standards must be in satisfactory working condition, properly calibrated/tested, and of the proper kind for the purpose for which they are intended. Tools should include an adequate supply of special tools appropriate to the ratings and curriculum. If students are required to provide hand tools, then the school should list the specific tools with the curriculum and provide a copy of this list to the students. Shop equipment

and special tools should be maintained in good working order and be in a condition for safe operation.

All tools and equipment should be maintained in good working order and be in a condition for safe operation. The types of tools and equipment required for Aviation General, Airframe, and Powerplant teaching include the ones listed below:

Common hand tools, portable tools, precision tools, machine tools, torquing tools, shop equipment and machinery, specialized tools and equipment, airframe structures, aircraft, airframes, powerplants, propellers, and components of this equipment

FAA FAR Part 147 states: Each certified Aviation Maintenance Technician school shall provide facilities, equipment, and material equal to the standards currently required for the issue of the certificate and rating that it holds.

Refer to FAA FAR Part 147 and industry publications for more information about required levels of proficiency, hours of instruction, and updates to occupational titles and training requirements. Keeping pace with the standards of industry and maintaining a high quality of training requires ongoing linkages with industry and FAA representatives.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 9.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be

exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Perform basic electricity skills.
- 02.0 Perform basic aircraft drawing skills.
- 03.0 Demonstrate aircraft weight and balance skills.
- 04.0 Maintain aircraft fluid lines and fittings.
- 05.0 Perform aircraft materials and processes skills.
- 06.0 Perform ground operations and servicing duties.
- 07.0 Perform cleaning and corrosion-control operations.
- 08.0 Demonstrate mathematical skills.
- 09.0 Maintain forms and records.
- 10.0 Apply basic physics to aircraft systems.
- 11.0 Demonstrate appropriate understanding of basic science.
- 12.0 Demonstrate the use of maintenance publications.
- 13.0 Interpret mechanic privileges and limitations.
- 14.0 Identify Federal Aviation Administration (FAA) licensing requirements.
- 15.0 Demonstrate appropriate communication skills.
- 16.0 Demonstrate employability skills as an aviation general maintenance technician helper.
- 17.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation general maintenance occupations.
- 18.0 Maintain wood structures.
- 19.0 Perform aircraft covering.
- 20.0 Apply aircraft finishes.
- 21.0 Repair sheet-metal structures.
- 22.0 Perform welding.
- 23.0 Perform assembly and rigging.
- 24.0 Perform airframe inspection.
- 25.0 Maintain aircraft landing-gear systems.
- 26.0 Maintain hydraulic and pneumatic power systems.
- 27.0 Maintain cabin atmosphere control systems.
- 28.0 Maintain aircraft instrument systems.
- 29.0 Maintain communication and navigation systems.
- 30.0 Inspect and repair aircraft fuel systems.
- 31.0 Inspect and repair aircraft electrical systems.
- 32.0 Inspect and repair position and warning systems.
- 33.0 Maintain ice and rain control systems.
- 34.0 Inspect and repair aircraft fire-protection systems.

- 35.0 Demonstrate knowledge of Federal Aviation Administration Airframe licensing requirements.
- 36.0 Demonstrate employability skills as an aviation maintenance technician with a FAA airframe rating.
- 37.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation airframe maintenance occupations.

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Student Performance Standards**

**Program Title: Aviation Airframe Mechanic**  
**PSAV Number: I470612**

**Course Number: AMT0700**  
**Occupational Completion Point: A**  
**Aviation General Maintenance Technician Helper – 480 Hours – SOC Code 49-3011**

01.0 Perform basic electricity skills--The student will be able to:

- 01.01 Calculate and measure capacitance and inductance. [FAA FAR Part 147, Level 2]
- 01.02 Calculate and measure electrical power. [FAA FAR Part 147, Level 2]
- 01.03 Measure voltage, current, resistance, and continuity. [FAA FAR Part 147, Level 3]
- 01.04 Determine the relationship of voltage, current, and resistance in electrical circuits. [FAA FAR Part 147, Level 3]
- 01.05 Read and interpret aircraft electrical-circuit diagrams, including solid-state devices and logic functions. [FAA FAR Part 147, [Level 3]
- 01.06 Inspect and service batteries. [FAA FAR Part 147, Level 3]
- 01.07 Utilize proper electrical safety procedures.

02.0 Perform basic aircraft drawing skills--The student will be able to:

- 02.01 Use aircraft drawings, symbols, and system schematics. [FAA FAR Part 147, Level 2]
- 02.02 Draw sketches of repairs and alterations. [FAA FAR Part 147, Level 3]
- 02.03 Use blueprint information. [FAA FAR Part 147, Level 3]
- 02.04 Use graphs and charts. [FAA FAR Part 147, Level 3]

03.0 Demonstrate aircraft weight and balance skills--The student will be able to:

- 03.01 Weigh aircraft.[FAA FAR Part 147, Level 2]
- 03.02 Perform complete weight-and-balance check and record data. [FAA FAR Part 147, Level 3]
- 03.03 Utilize proper personal safety procedures.

04.0 Maintain aircraft fluid lines and fittings--The student will be able to:

- 04.01 Fabricate and install rigid and flexible fluid lines and fittings. [FAA FAR Part 147, Level 3]
- 04.02 Identify and utilize special fluid-line tools.
- 04.03 Utilize proper personal safety procedures for fluid lines and fittings.

05.0 Perform aircraft materials and processes skills--The student will be able to:

- 05.01 Identify and select appropriate nondestructive testing methods. [FAA FAR Part 147, Level 1]

- 05.02 Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections. [FAA FAR Part 147, Level 2]
  - 05.03 Perform basic heat-testing processes. [FAA FAR Part 147, Level 1]
  - 05.04 Identify and select aircraft hardware and materials.[FAA FAR Part 147, Level 3]
  - 05.05 Inspect and check welds. [FAA FAR Part 147, Level 3]
  - 05.06 Perform precision measurements. [FAA FAR Part 147, Level 3]
  - 05.07 Perform safety-wiring techniques.
- 06.0 Perform ground operations and servicing duties--The student will be able to:
- 06.01 Start, ground operate, move, service, and secure aircraft and identify typical ground-operations hazards. [FAA FAR Part 147, Level 2]
  - 06.02 Identify and select fuels. [FAA FAR Part 147, Level 2]
  - 06.03 Comply with prescribed shop and personal safety procedures.
- 07.0 Perform cleaning and corrosion-control operations--The student will be able to:
- 07.01 Identify and select cleaning materials. [FAA FAR Part 147, Level 3].
  - 07.02 Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. [FAA FAR Part 147, Level 3]
  - 07.03 Identify and utilize appropriate equipment for cleaning and corrosion control.
  - 07.04 Observe appropriate personal safety procedures for corrosive chemicals.
- 08.0 Demonstrate mathematical skills--The student will be able to:
- 08.01 Extract roots and raise numbers to a given power. [FAA FAR Part 147, Level 3]
  - 08.02 Determine areas and volumes of various geometrical shapes by solving problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.[FAA FAR Part 147, Level 3]
  - 08.03 Solve ratio, proportion, and percentage problems. [FAA FAR Part 147, Level 3]
  - 08.04 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers. [FAA FAR Part 147, Level 3]
  - 08.05 Measure tolerances on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
  - 08.06 Identify costs, prices, and taxes for the purchase and sale of materials that may be required when performing the duties of an Aviation Maintenance Technician.
- 09.0 Maintain forms and records--The student will be able to:
- 09.01 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records. [FAA FAR Part 147, Level 3]
  - 09.02 Complete required maintenance forms, records, and inspection reports. [FAA FAR Part 147, Level 3]
- 10.0 Apply basic physics to aircraft systems--The student will be able to:
- 10.01 Use and understand the principles of simple machines; sound, fluid, and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight. [FAA FAR Part 147, Level 2]

- 11.0 Demonstrate appropriate understanding of basic science--The student will be able to:
  - 11.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 11.02 Draw conclusions or make inferences from data.
  - 11.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
  - 11.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
  
- 12.0 Demonstrate the use of maintenance publications--The student will be able to:
  - 12.01 Demonstrate ability to read, comprehend, and apply information contained in FAA and manufacturers' aircraft maintenance specifications, data sheets, manuals, publications, and related Federal Aviation Regulations, Airworthiness Directives, and Advisory material. [FAA FAR Part 147, Level 3]
  - 12.02 Read technical data. [FAA FAR Part 147, Level 3]
  
- 13.0 Interpret mechanic privileges and limitations--The student will be able to:
  - 13.01 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter.[FAA FAR Part 147, Level 3]
  
- 14.0 Identify Federal Aviation Administration licensing requirements--The student will be able to:
  - 14.01 Identify the information in Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for Aviation Maintenance Technician (AMT) certification and ratings.
  - 14.02 Identify the FAA requirements that must be satisfied in order to display the FAA Airframe and Powerplant license.
  
- 15.0 Demonstrate appropriate communication skills--The student will be able to:
  - 15.01 Write logical and understandable statements or phrases to accurately complete forms/invoices commonly used in business and industry.
  - 15.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 15.03 Read and follow written and oral instructions.
  - 15.04 Answer and ask questions coherently and concisely.
  - 15.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 15.06 Demonstrate appropriate telephone/communication skills.
  
- 16.0 Demonstrate employability skills as an aviation general maintenance technician helper--The student will be able to:
  - 16.01 Conduct a job search.
  - 16.02 Secure information about a job.
  - 16.03 Identify documents that may be required when applying for a job position.
  - 16.04 Complete a job-application form correctly.
  - 16.05 Demonstrate job-interview skills.



- 16.06 Identify appropriate responses to criticism from employer, supervisor, or other employees.
  - 16.07 Identify work habits for getting and keeping a job.
  - 16.08 Explain how to make job changes.
  - 16.09 Explain the purpose of the Right-to-Know" law.
- 17.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation general maintenance occupations--The student will be able to:
- 17.01 Define entrepreneurship.
  - 17.02 Describe the importance of entrepreneurship to the United States economy.
  - 17.03 List the advantages and disadvantages of business ownership.
  - 17.04 Identify the risks involved in ownership of a business.
  - 17.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 17.06 Identify the business skills needed to operate a small business efficiently and effectively.

**Course Number: AMT0710**

**Aviation Maintenance Technician With FAA Airframe Rating (1 Of 2) – 480 Hours – SOC Code 49-3011**

- 18.0 Maintain wood structures--The student will be able to:
- 18.01 Service and repair wood structures. [FAA FAR Part 147, Level 1]
  - 18.02 Identify wood defects. [FAA FAR Part 147, Level 1]
  - 18.03 Inspect wood structures. [FAA FAR Part 147, Level 1]
- 19.0 Perform aircraft covering--The student will be able to:
- 19.01 Select and apply fabric and fiberglass covering materials. [FAA FAR Part 147, Level 1]
  - 19.02 Inspect, test, and repair fabric and fiberglass. [FAA FAR Part 147, Level 1]
- 20.0 Apply aircraft finishes--The student will be able to:
- 20.01 Apply trim, letters, and touch-up paint. [FAA FAR Part 147, Level 1]
  - 20.02 Identify and select aircraft finishing materials. [FAA FAR Part 147, Level 2]
  - 20.03 Apply finishing materials. [FAA FAR Part 147, Level 2]
  - 20.04 Inspect finishes and identify defects. [FAA FAR Part 147, Level 2]
- 21.0 Repair sheet-metal structures--The student will be able to:
- 21.01 Select, install, and remove special fasteners for metallic, bonded, and composite structures. [FAA FAR Part 147, Level 2]
  - 21.02 Inspect bonded structures. [FAA FAR Part 147, Level 2]
  - 21.03 Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures. [FAA FAR Part 147, Level 2]
  - 21.04 Inspect, check, service, and repair windows, doors, and interior furnishings. [FAA FAR Part 147, Level 2]
  - 21.05 Inspect and repair sheet-metal structures. [FAA FAR Part 147, Level 3]
  - 21.06 Install conventional rivets. [FAA FAR Part 147, Level 3]

- 21.07 Form, lay out, and bend sheet metal. [FAA FAR Part 147, Level 3]
  - 21.08 Identify and utilize appropriate metalworking tools and equipment.
- 22.0 Perform welding--The student will be able to:
- 22.01 Weld magnesium and titanium. [FAA FAR Part 147, Level 1]
  - 22.02 Solder stainless steel. [FAA FAR Part 147, Level 1]
  - 22.03 Fabricate tubular structures. [FAA FAR Part 147, Level 1]
  - 22.04 Solder, braze, gas-weld, and arc-weld steel. [FAA FAR Part 147, Level 2]
  - 22.05 Weld aluminum and stainless steel. [FAA FAR Part 147, Level 1]
  - 22.06 Identify and utilize appropriate welding tools and equipment.
- 23.0 Perform assembly and rigging--The student will be able to:
- 23.01 Rig rotary-wing aircraft. [FAA FAR Part 147, Level 1]
  - 23.02 Rig fixed-wing aircraft. [FAA FAR Part 147, Level 2]
  - 23.03 Check alignment of structures. [FAA FAR Part 147, Level 2]
  - 23.04 Assemble aircraft components, including flight control surfaces. [FAA FAR Part 147, Level 3]
  - 23.05 Balance, rig, and inspect movable primary and secondary flight control structures. [FAA FAR Part 147, Level 3]
  - 23.06 Jack aircraft. [FAA FAR Part 147, Level 3]
  - 23.07 Identify and utilize appropriate rigging tools and equipment.
- 24.0 Perform airframe inspection--The student will be able to:
- 24.01 Perform aircraft conformity and airworthiness inspections. [FAA FAR Part 147, Level 3]
- 25.0 Maintain aircraft landing-gear systems--The student will be able to:
- 25.01 Inspect, check, service, and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems. [FAA FAR Part 147, Level 3]
- 26.0 Maintain hydraulic and pneumatic power systems--The student will be able to:
- 26.01 Repair hydraulic and pneumatic power system components. [FAA FAR Part 147, Level 2]
  - 26.02 Identify and select hydraulic fluids. [FAA FAR Part 147, Level 3]
  - 26.03 Inspect, check, service, troubleshoot, and repair hydraulic and pneumatic power systems. [FAA FAR Part 147, Level 3]
  - 26.04 Identify and utilize appropriate hydraulic and pneumatic tools and equipment.
- 27.0 Maintain cabin atmosphere-control systems--The student will be able to:
- 27.01 Inspect, check, troubleshoot, service, and repair heating, cooling, air-conditioning, pressurization systems, and air-cycle machines. [FAA FAR Part 147, Level 1]
  - 27.02 Inspect, check, troubleshoot, service, and repair oxygen systems. [FAA FAR Part 147, Level 2]

- 28.0 Maintain aircraft instrument systems--The student will be able to:
- 28.01 Inspect, check, service, troubleshoot, and repair electronic flight-instrument systems and both mechanical and electrical heading, speed, altitude, temperature, pressure, and position-indicating systems to include the use of built-in test equipment. [FAA FAR Part 147, Level 1]
  - 28.02 Install instruments and perform a static pressure-system leak test. [FAA FAR Part 147, Level 2]
- 29.0 Maintain communication and navigation systems--The student will be able to:
- 29.01 Inspect, check, and troubleshoot autopilot, servos, and approach coupling systems. [FAA FAR Part 147, Level 1]
  - 29.02 Inspect, check, and service aircraft electronic communication and navigation systems, including VHF passenger address interphones and static-discharge devices, aircraft VOR, ILS, LORAN, radar beacon transponders, flight-management computers, and GPWS. [FAA FAR Part 147, Level 1]
  - 29.03 Inspect and repair antenna and electronic equipment installations. [FAA FAR Part 147, Level 2]
  - 29.04 Identify and utilize special electronic tools and equipment. [FAA FAR Part 147, Level 2]

**Course Number: AMT0711****Occupational Completion Point: B****Aviation Maintenance Technician With FAA Airframe Rating (2 Of 2) – 480 Hours – SOC Code 49-3011**

- 30.0 Inspect and repair aircraft fuel systems--The student will be able to:
- 30.01 Check and service fuel-dump systems. [FAA FAR Part 147, Level 1]
  - 30.02 Perform fuel-management transfer, re-fueling, and de-fueling. [FAA FAR Part 147, Level 1]
  - 30.03 Inspect, check, and repair pressure fuel systems.[FAA FAR Part 147, Level 1]
  - 30.04 Repair aircraft fuel-system components. [FAA FAR Part 147, Level 2]
  - 30.05 Inspect and repair fluid quantity-indicating systems. [FAA FAR Part 147, Level 2]
  - 30.06 Troubleshoot, service, and repair fluid pressure and temperature warning systems. [FAA FAR Part 147, Level 2]
  - 30.07 Inspect, check, service, troubleshoot, and repair aircraft fuel systems. [FAA FAR Part 147, Level 3]
- 31.0 Inspect and repair aircraft electrical systems--The student will be able to:
- 31.01 Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturers' specifications; and repair pins and sockets of aircraft connectors. [FAA FAR Part 147, Level 2]
  - 31.02 Install, check, and service airframe electric wiring, controls, switches, indicators, and protective devices. [FAA FAR Part 147, Level 3]
  - 31.03 Inspect, check, troubleshoot, service, and repair alternating and direct current electrical systems. [FAA FAR Part 147, Level 3]
  - 31.04 Inspect, check, and troubleshoot constant and integrated speed- drive generators. [FAA FAR Part 147, Level 1]

- 31.05 Identify and utilize appropriate electrical tools and equipment.
- 32.0 Inspect and repair position and warning systems--The student will be able to:
  - 32.01 Inspect, check, and service speed and configuration warning systems, electrical brake controls, and antiskid systems.[FAA FAR Part 147, Level 2]
  - 32.02 Inspect, check, troubleshoot, and service landing gear position- indicating and warning systems. [FAA FAR Part 147, Level 3]
- 33.0 Maintain ice and rain control systems--The student will be able to:
  - 33.01 Inspect, check, troubleshoot, service, and repair airframe ice and rain control systems. [FAA FAR Part 147, Level 2]
- 34.0 Inspect and repair aircraft fire-protection systems--The student will be able to:
  - 34.01 Inspect, check, and service smoke and carbon monoxide detection systems. [FAA FAR Part 147, Level 1]
  - 34.02 Inspect, check, service, troubleshoot, and repair aircraft fire detection and extinguishing systems. [FAA FAR Part 147, Level 3]
- 35.0 Demonstrate knowledge of Federal Aviation Administration Airframe Licensing requirements--The student will be able to:
  - 35.01 Explain the requirements for obtaining FAA authorization to take the FAA Airframe examinations.
- 36.0 Demonstrate employability skills as an Aviation Maintenance Technician (AMT) with an FAA Airframe Rating--The student will be able to:
  - 36.01 Conduct a job search for an AMT with FAA airframe rating position.
  - 36.02 Secure information about the requirements for an AMT with FAA airframe rating in a particular firm.
  - 36.03 Identify documents that may be required when applying for an AMT with FAA airframe rating position.
  - 36.04 Complete a job-application form correctly.
  - 36.05 Demonstrate competency in job-interview techniques.
  - 36.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other employees.
  - 36.07 Identify or adopt acceptable work habits.
  - 36.08 Demonstrate knowledge of how to make job changes appropriately.
  - 36.09 Demonstrate acceptable employee health habits.
  - 36.10 Demonstrate knowledge of the "Right-to-Know" law.
- 37.0 Demonstrate an understanding of entrepreneurship related opportunities in aviation airframe maintenance occupations--the student will be able to:
  - 37.01 Define entrepreneurship.
  - 37.02 Describe the importance of entrepreneurship to aviation airframe maintenance occupations.

- 37.03 List the advantages and disadvantages of aviation airframe maintenance business ownership.
- 37.04 Identify the risks involved in ownership of an aviation airframe maintenance business.
- 37.05 Identify the necessary personal characteristics of a successful aviation airframe maintenance business owner.
- 37.06 Identify the business skills needed to operate an aviation airframe maintenance business efficiently and effectively.

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**Course Title:** Aviation Maintenance General 1  
**Course Number:** 8715110  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce general hangar and shop safety, environmental concerns, mathematics, physics, basic aerodynamics, federal aviation regulations, publications and records.

06.0 Perform ground operations and servicing duties--The student will be able to:

- 06.01 Start, ground operate, move, service, and secure aircraft and identify typical ground-operations hazards. [FAA FAR Part 147, Level 2]
- 06.02 Identify and select fuels. [FAA FAR Part 147, Level 2]
- 06.03 Comply with prescribed shop and personal safety procedures.

08.0 Demonstrate mathematical skills--The student will be able to:

- 08.01 Extract roots and raise numbers to a given power. [FAA FAR Part 147, Level 3]
- 08.02 Determine areas and volumes of various geometrical shapes by solving problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.[FAA FAR Part 147, Level 3]
- 08.03 Solve ratio, proportion, and percentage problems. [FAA FAR Part 147, Level 3]
- 08.04 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers. [FAA FAR Part 147, Level 3]
- 08.05 Measure tolerances on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
- 08.06 Identify costs, prices, and taxes for the purchase and sale of materials that may be required when performing the duties of an Aviation Maintenance Technician.

09.0 Maintain forms and records--The student will be able to:

- 09.01 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records. [FAA FAR Part 147, Level 3]
- 09.02 Complete required maintenance forms, records, and inspection reports. [FAA FAR Part 147, Level 3]

10.0 Apply basic physics to aircraft systems--The student will be able to:

- 10.01 Use and understand the principles of simple machines; sound, fluid, and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight. [FAA FAR Part 147, Level 2]

12.0 Demonstrate the use of maintenance publications--The student will be able to:

- 12.01 Demonstrate ability to read, comprehend, and apply information contained in FAA and manufacturers' aircraft maintenance specifications, data sheets, manuals, publications, and related Federal Aviation Regulations, Airworthiness Directives, and Advisory material. [FAA FAR Part 147, Level 3]
- 12.02 Read technical data. [FAA FAR Part 147, Level 3]
- 13.0 Interpret mechanic privileges and limitations--The student will be able to:
  - 13.01 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter.[FAA FAR Part 147, Level 3]
- 15.0 Demonstrate appropriate communication skills--The student will be able to:
  - 15.01 Write logical and understandable statements or phrases to accurately complete forms/invoices commonly used in business and industry.
  - 15.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 15.03 Read and follow written and oral instructions.
  - 15.04 Answer and ask questions coherently and concisely.
  - 15.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 15.06 Demonstrate appropriate telephone/communication skills.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aviation Maintenance General 2  
**Course Number:** 8715120  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce aircraft hardware and precision measuring instruments; blueprints and drawings; hand and power tools; and fluid lines and fittings.

02.0 Perform basic aircraft drawing skills--The student will be able to:

- 02.01 Use aircraft drawings, symbols, and system schematics. [FAA FAR Part 147, Level 2]
- 02.02 Draw sketches of repairs and alterations. [FAA FAR Part 147, Level 3]
- 02.03 Use blueprint information. [FAA FAR Part 147, Level 3]
- 02.04 Use graphs and charts. [FAA FAR Part 147, Level 3]

04.0 Maintain aircraft fluid lines and fittings--The student will be able to:

- 04.01 Fabricate and install rigid and flexible fluid lines and fittings. [FAA FAR Part 147, Level 3]
- 04.02 Identify and utilize special fluid-line tools.
- 04.03 Utilize proper personal safety procedures for fluid lines and fittings.



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Student Performance Standards**

**Course Title:** Aviation Maintenance General 3  
**Course Number:** 8715130  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce basic electricity and DC electrical circuits; aircraft battery service and inspection; AC electrical circuits and solid-state circuits.

01.0 Perform basic electricity skills--The student will be able to:

- 01.01 Calculate and measure capacitance and inductance. [FAA FAR Part 147, Level 2]
- 01.02 Calculate and measure electrical power. [FAA FAR Part 147, Level 2]
- 01.03 Measure voltage, current, resistance, and continuity. [FAA FAR Part 147, Level 3]
- 01.04 Determine the relationship of voltage, current, and resistance in electrical circuits. [FAA FAR Part 147, Level 3]
- 01.05 Read and interpret aircraft electrical-circuit diagrams, including solid-state devices and logic functions. [FAA FAR Part 147, [Level 3]
- 01.06 Inspect and service batteries. [FAA FAR Part 147, Level 3]
- 01.07 Utilize proper electrical safety procedures.

11.0 Demonstrate appropriate understanding of basic science--The student will be able to:

- 11.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 11.02 Draw conclusions or make inferences from data.
- 11.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
- 11.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aviation Maintenance General 4  
**Course Number:** 8715140  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce structural materials and processes, non-destructive inspection, aircraft cleaning and corrosion control, weight and balance, and aircraft ground operations and servicing.

03.0 Demonstrate aircraft weight and balance skills--The student will be able to:

- 03.01 Weigh aircraft.[FAA FAR Part 147, Level 2]
- 03.02 Perform complete weight-and-balance check and record data. [FAA FAR Part 147, Level 3]
- 03.03 Utilize proper personal safety procedures.

05.0 Perform aircraft materials and processes skills--The student will be able to:

- 05.01 Identify and select appropriate nondestructive testing methods. [FAA FAR Part 147, Level 1]
- 05.02 Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections. [FAA FAR Part 147, Level 2]
- 05.03 Perform basic heat-testing processes. [FAA FAR Part 147, Level 1]
- 05.04 Identify and select aircraft hardware and materials.[FAA FAR Part 147, Level 3]
- 05.05 Inspect and check welds. [FAA FAR Part 147, Level 3]
- 05.06 Perform precision measurements. [FAA FAR Part 147, Level 3]
- 05.07 Perform safety-wiring techniques.

07.0 Perform cleaning and corrosion-control operations--The student will be able to:

- 07.01 Identify and select cleaning materials. [FAA FAR Part 147, Level 3].
- 07.02 Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. [FAA FAR Part 147, Level 3]
- 07.03 Identify and utilize appropriate equipment for cleaning and corrosion control.
- 07.04 Observe appropriate personal safety procedures for corrosive chemicals.

14.0 Identify Federal Aviation Administration licensing requirements--The student will be able to:

- 14.01 Identify the information in Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for Aviation Maintenance Technician (AMT) certification and ratings.
- 14.02 Identify the FAA requirements that must be satisfied in order to display the FAA Airframe and Powerplant license.

16.0 Demonstrate employability skills as an aviation general maintenance technician helper--  
The student will be able to:

- 16.01 Conduct a job search.
- 16.02 Secure information about a job.
- 16.03 Identify documents that may be required when applying for a job position.
- 16.04 Complete a job-application form correctly.
- 16.05 Demonstrate job-interview skills.
- 16.06 Identify appropriate responses to criticism from employer, supervisor, or other employees.
- 16.07 Identify work habits for getting and keeping a job.
- 16.08 Explain how to make job changes.
- 16.09 Explain the purpose of the "Right-to-Know" law.

17.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation general maintenance occupations--The student will be able to:

- 17.01 Define entrepreneurship.
- 17.02 Describe the importance of entrepreneurship to the United States economy.
- 17.03 List the advantages and disadvantages of business ownership.
- 17.04 Identify the risks involved in ownership of a business.
- 17.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 17.06 Identify the business skills needed to operate a small business efficiently and effectively.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Aircraft Powerplant Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>Secondary</b>	<b>PSAV</b>
Program Number	<b>8715200</b>	<b>I470622</b>
CIP Number	0647060800	0647060800
Grade Level	9-12 30,31	30, 31
Standard Length	4 credits (General Only)	1,440 Hours
Teacher Certification	AIR MECH @7G	AIR MECH @7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3011	49-3011
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 10.0 Language: 9.0 Reading: 10.0

### **Purpose**

The purpose of this program is to prepare students for employment or advanced training in the commercial and general aviation industry. Instruction is designed to prepare students for Federal Aviation Administration (FAA) license examinations for Airframe ratings. Federal Aviation Regulation (FAR) Part 147 identifies minimum requirements for AMT schools. Any changes to the FAA-approved course content must be approved in advance. This program prepares students for employment as an Aviation General Maintenance Technician Helper, and an Aviation Maintenance Technician with FAA Powerplant Rating.

This program focuses on broad, transferable skills, stresses understanding of all aspects of the aviation maintenance industry, and demonstrates elements of the industry such as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

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.

### Program Structure

This program is a planned sequence of instruction consisting of a core and one OCP.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AMT0700	Aviation General Maintenance Technician Helper	480	49-3011
	AMT0720	Aviation Maintenance Technician with FAA Power Plant Rating 1	480	49-3011
B	AMT0721	Aviation Maintenance Technician with FAA Power Plant Rating 2	480	49-3011

The following table illustrates the **Secondary** program structure:

**Aviation Maintenance General** - 4 secondary credits (480 hours FAA required minimum). These courses may be used as part of “Powerplant” or “Airframe”. The outcomes and student performance standards are the same as “General”. The courses can be used only once for secondary students enrolled in either “Powerplant” or “Airframe”.

The FAA required subject matter may be sequenced in courses 1 through 4 as necessary to meet program specific General requirements. The student will be provided with a transcript of the FAA completed requirements when he or she leaves/moves as proof of completion/competency. The total FAA approved General program may not extend beyond the number courses for the high school program.

Aviation Maintenance General Only

OCP	Course Number	Course Title	Length	SOC Code	Level
	8715110	Aviation Maintenance General 1	1 credit	49-3011	3
	8715120	Aviation Maintenance General 2	1 credit	49-3011	3

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8715130	Aviation Maintenance General 3	1 credit	49-3011	3
	8715140	Aviation Maintenance General 4	1 credit	49-3011	3

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Classroom, shop, and laboratory activities are an integral part of this program. FAR Section 147.21(e) requires teaching of at least 50 percent of the curriculum in the shop or laboratory. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes found in the industry. Equipment and supplies should be provided to enhance hands-on experiences for students in the chosen occupation.

### Special Notes

#### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

Required FAA exams include GENERAL written, oral, and practical; AIRFRAME written, oral, and practical; and POWERPLANT written, oral, and practical. The only way a person can get authorization to take these examinations is to (1) graduate from an approved school or (2) obtain permission from the FAA to take the test based on prior experience on certified aircraft. Schools cannot grant permission (FAA FAR, Part 65 and Part 147, Subpart C 147.31).

Since an Aviation Maintenance Technician School (AMTS) is certified and inspected by the FAA, satisfaction of FAR Part 147 requirements should be the primary concern of an AMTS. When local and state educational requirements conflict with the FAA's regulation of an AMTS, those requirements must be resolved to satisfy FAR Part 147. In other words, FAA standards take precedence over other requirements. The FAA specifies minimum hours required and encourages schools to exceed minimum standards for the curriculum. The course content specified by the FAA may not be lowered.

"FAA FAR Part 147" identifies standards required by the FAA. Minimum teaching levels expected by the FAA also appear:

- Level 1:** knowledge of general principles
- Level 2:** knowledge of general principles and limited practical application
- Level 3:** knowledge of general principles with a high degree of practical application and hands-on skill levels according to FAA FAR Part 147: For subjects taught at Level 3, all special tools required to meet "return to service" standards must be in satisfactory working condition, properly calibrated/tested, and of the proper

kind for the purpose for which they are intended. Tools should include an adequate supply of special tools appropriate to the ratings and curriculum. If students are required to provide hand tools, then the school should list the specific tools with the curriculum and provide a copy of this list to the students. Shop equipment and special tools should be maintained in good working order and be in a condition for safe operation.

All tools and equipment should be maintained in good working order and be in a condition for safe operation. The types of tools and equipment required for Aviation General, Airframe, and Powerplant teaching include the ones listed below:

Common hand tools, portable tools, precision tools, machine tools, torquing tools, shop equipment and machinery, specialized tools and equipment, airframe structures, aircraft, airframes, powerplants, propellers, and components of this equipment

FAA FAR Part 147 states: Each certified Aviation Maintenance Technician school shall provide facilities, equipment, and material equal to the standards currently required for the issue of the certificate and rating that it holds.

Refer to FAA FAR Part 147 and industry publications for more information about required levels of proficiency, hours of instruction, and updates to occupational titles and training requirements. Keeping pace with the standards of industry and maintaining a high quality of training requires ongoing linkages with industry and FAA representatives.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 9.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.



For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Perform basic electricity skills.
- 02.0 Perform basic aircraft drawing skills.
- 03.0 Demonstrate aircraft weight and balance skills.
- 04.0 Maintain aircraft fluid lines and fittings.
- 05.0 Perform aircraft materials and processes skills.
- 06.0 Perform ground operations and servicing duties.
- 07.0 Perform cleaning and corrosion control operations.
- 08.0 Demonstrate mathematical skills.
- 09.0 Maintain forms and records.
- 10.0 Apply basic physics to aircraft systems.
- 11.0 Demonstrate appropriate understanding of basic science.
- 12.0 Demonstrate the use of maintenance publications.
- 13.0 Interpret mechanic privileges and limitations.
- 14.0 Identify Federal Aviation Administration licensing requirements.
- 15.0 Demonstrate appropriate communication skills.
- 16.0 Demonstrate employability skills as an aviation general maintenance technician helper.
- 17.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation general maintenance occupations.
- 18.0 Perform basic reciprocating engine skills.
- 19.0 Perform basic turbine engine skills.
- 20.0 Perform engine inspection.
- 21.0 Maintain engine instrument systems.
- 22.0 Maintain engine fire-protection systems.
- 23.0 Maintain engine electrical systems.
- 24.0 Maintain lubrication systems.
- 25.0 Maintain ignition systems.
- 26.0 Maintain fuel-metering systems.
- 27.0 Maintain engine fuel systems.
- 28.0 Maintain induction systems.
- 29.0 Maintain engine cooling systems.
- 30.0 Maintain engine exhaust and reverser systems.

- 31.0 Maintain aircraft propellers.
- 32.0 Demonstrate knowledge of FAA Powerplant licensing requirements.
- 33.0 Demonstrate employability skills for an aviation maintenance technician with a FAA powerplant rating.
- 34.0 Demonstrate an understanding of entrepreneurship opportunities in aviation powerplant maintenance occupations.

**Florida Department of Education  
Student Performance Standards**

**Program Title: Aviation Powerplant Mechanic**  
**PSAV Number: I470622**

**Course Number: AMT0700**  
**Occupational Completion Point: A**  
**Aviation General Maintenance Technician Helper – 480 Hours – SOC Code 49-3011**

01.0 Perform basic electricity skills--The student will be able to:

- 01.01 Calculate and measure capacitance and inductance. [FAA FAR Part 147, Level 2]
- 01.02 Calculate and measure electrical power. [FAA FAR Part 147, Level 2]
- 01.03 Measure voltage, current, resistance, and continuity. [FAA FAR Part 147, Level 3]
- 01.04 Determine the relationship of voltage, current, and resistance in electrical circuits. [FAA FAR Part 147, Level 3]
- 01.05 Read and interpret aircraft electrical-circuit diagrams, including solid-state devices and logic functions. [FAA FAR Part 147, Level 3]
- 01.06 Inspect and service batteries. [FAA FAR Part 147, Level 3]
- 01.07 Utilize proper electrical safety procedures.

02.0 Perform basic aircraft drawing skills--The student will be able to:

- 02.01 Use aircraft drawings, symbols, and system schematics. [FAA FAR Part 147, Level 2]
- 02.02 Draw sketches of repairs and alterations. [FAA FAR Part 147, Level 3]
- 02.03 Use blueprint information. [FAA FAR Part 147, Level 3]
- 02.04 Use graphs and charts. [FAA FAR Part 147, Level 3]

03.0 Demonstrate aircraft weight and balance skills--The student will be able to:

- 03.01 Weigh aircraft. [FAA FAR Part 147, Level 2]
- 03.02 Perform complete weight-and-balance check and record data. [FAA FAR Part 147, Level 3]
- 03.03 Utilize proper personal safety procedures.

04.0 Maintain aircraft fluid lines and fittings--The student will be able to:

- 04.01 Fabricate and install rigid and flexible fluid lines and fittings. [FAA FAR Part 147, Level 3]
- 04.02 Identify and utilize special fluid-line tools.
- 04.03 Utilize proper personal safety procedures for fluid lines and fittings.

05.0 Perform aircraft materials and processes skills--The student will be able to:

- 05.01 Identify and select appropriate nondestructive testing methods. [FAA FAR Part 147, Level 1]

- 05.02 Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections. [FAA FAR Part 147, Level 2]
  - 05.03 Perform basic heat-testing processes. [FAA FAR Part 147, Level 1]
  - 05.04 Identify and select aircraft hardware and materials. [FAA FAR Part 147, Level 3]
  - 05.05 Inspect and check welds. [FAA FAR Part 147, Level 3]
  - 05.06 Perform precision measurements. [FAA FAR Part 147, Level 3]
  - 05.07 Perform safety wiring techniques.
- 06.0 Perform ground operations and servicing duties--The student will be able to:
- 06.01 Start, ground-operate, move, service, and secure aircraft and identify typical ground operations hazards. [FAA FAR Part 147, Level 2]
  - 06.02 Identify and select fuels. [FAA FAR Part 147, Level 2]
  - 06.03 Comply with prescribed shop and personal safety procedures.
- 07.0 Perform cleaning and corrosion control operations--The student will be able to:
- 07.01 Identify and select cleaning materials. [FAA FAR Part 147, Level 3]
  - 07.02 Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. [FAA FAR Part 147, Level 3]
  - 07.03 Identify and utilize appropriate equipment for cleaning and corrosion control.
  - 07.04 Observe appropriate personal safety procedures for corrosive chemicals.
- 08.0 Demonstrate mathematical skills--The student will be able to:
- 08.01 Extract roots and raise numbers to a given power. [FAA FAR Part 147, Level 3]
  - 08.02 Determine areas and volumes of various geometrical shapes by solving problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders. [FAA FAR Part 147, Level 3]
  - 08.03 Solve ratio, proportion, and percentage problems. [FAA FAR Part 147, Level 3]
  - 08.04 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers. [FAA FAR Part 147, Level 3]
  - 08.05 Measure tolerances on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
  - 08.06 Identify costs, prices, and taxes for the purchase and sale of materials that may be required when performing the duties of an Aviation Maintenance Technician.
- 09.0 Maintain forms and records--The student will be able to:
- 09.01 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records. [FAA FAR Part 147, Level 3]
  - 09.02 Complete required maintenance forms, records, and inspection reports. [FAA FAR Part 147, Level 3]
- 10.0 Apply basic physics to aircraft systems--The student will be able to:

- 10.01 Use and understand the principles of simple machines; sound, fluid, and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight. [FAA FAR Part 147, Level 2]
- 11.0 Demonstrate appropriate understanding of basic science--The student will be able to:
  - 11.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 11.02 Draw conclusions or make inferences from data.
  - 11.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
  - 11.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.
- 12.0 Demonstrate the use of maintenance publications--The student will be able to:
  - 12.01 Demonstrate ability to read, comprehend, and apply information contained in FAA and manufacturers' aircraft maintenance specifications, data sheets, manuals, publications, and related Federal Aviation Regulations, Airworthiness Directives, and Advisory material. [FAA FAR Part 147, Level 3]
  - 12.02 Read technical data. [FAA FAR Part 147, Level 3]
- 13.0 Interpret mechanic privileges and limitations--The student will be able to:
  - 13.01 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter. [FAA FAR Part 147, Level 3]
- 14.0 Identify federal aviation administration licensing requirements--The student will be able to:
  - 14.01 Identify the information in Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for Aviation Maintenance Technician (AMT) certification and ratings.
  - 14.02 Identify the FAA requirements that must be satisfied in order to display the FAA Airframe and Powerplant license.
- 15.0 Demonstrate appropriate communication skills--The student will be able to:
  - 15.01 Write logical and understandable statements, or phrases, to accurately complete forms/invoices commonly used in business and industry.
  - 15.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 15.03 Read and follow written and oral instructions.
  - 15.04 Answer and ask questions coherently and concisely.
  - 15.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 15.06 Demonstrate appropriate telephone/communication skills.
- 16.0 Demonstrate employability skills as an aviation general maintenance technician helper--The student will be able to:

- 16.01 Conduct a job search.
  - 16.02 Secure information about a job.
  - 16.03 Identify documents that may be required when applying for a job position.
  - 16.04 Complete a job-application form correctly.
  - 16.05 Demonstrate job-interview skills.
  - 16.06 Identify appropriate responses to criticism from employer, supervisor, or other employees.
  - 16.07 Identify work habits for getting and keeping a job.
  - 16.08 Explain how to make job changes.
  - 16.09 Explain the purpose of the "Right-to-Know" law.
- 17.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation general maintenance occupations--The student will be able to:
- 17.01 Define entrepreneurship.
  - 17.02 Describe the importance of entrepreneurship to the United States economy.
  - 17.03 List the advantages and disadvantages of business ownership.
  - 17.04 Identify the risks involved in ownership of a business.
  - 17.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 17.06 Identify the business skills needed to operate a small business efficiently and effectively.

**Course: AMT0720**

**Aviation Maintenance Technician With FAA Powerplant Rating (1 Of 2) – 480 Hours – SOC Code 49-3011**

- 18.0 Perform basic reciprocating engine skills--The student will be able to:
- 18.01 Inspect and repair a radial engine. [FAA FAR Part 147, Level 1]
  - 18.02 Overhaul a reciprocating engine. [FAA FAR Part 147, Level 2]
  - 18.03 Inspect, check, service, and repair reciprocating engines and reciprocating. [FAA FAR Part 147, Level 3]
  - 18.04 Install, troubleshoot, and remove reciprocating engines. [FAA FAR Part 147, Level 3]
- 19.0 Perform basic turbine engine skills--The student will be able to:
- 19.01 Overhaul a turbine engine. [FAA FAR Part 147, Level 2]
  - 19.02 Inspect, check, service, and repair turbine engines and turbine engine installations. [FAA FAR Part 147, Level 3]
  - 19.03 Install, troubleshoot, and remove turbine engines. [FAA FAR Part 147, Level 3]
  - 19.04 Inspect and troubleshoot unducted fan systems and components. [FAA FAR Part 147, Level 1]
  - 19.05 Inspect, check, service, and troubleshoot turbine-driven auxiliary power units. [FAA FAR Part 147, Level 1]
- 20.0 Perform engine inspection--The student will be able to:
- 20.01 Perform powerplant conformity and airworthiness inspections. [FAA FAR Part 147, Level 3]

- 21.0 Maintain engine instrument systems--The student will be able to:
- 21.01 Troubleshoot, service, and repair electrical and mechanical fluid rate-of-flow indicating systems. [FAA FAR Part 147, Level 2]
  - 21.02 Inspect, check, service, troubleshoot, and repair electrical and mechanical engine temperature-, pressure-, and rpm-indicating systems. [FAA FAR Part 147, Level 3]
- 22.0 Maintain engine fire-protection systems--The student will be able to:
- 22.01 Inspect, check, service, troubleshoot, and repair engine fire-detection and extinguishing systems. [FAA FAR Part 147, Level 3]
- 23.0 Maintain engine electrical systems--The student will be able to:
- 23.01 Repair engine electrical system components. [FAA FAR Part 147, Level 2]
  - 23.02 Install, check, and service engine electrical wiring, controls, switches, indicators, and protective devices. [FAA FAR Part 147, Level 3]
- 24.0 Maintain lubrication systems--The student will be able to:
- 24.01 Identify and select lubricants. [FAA FAR Part 147, Level 2]
  - 24.02 Repair engine lubrication system components. [FAA FAR Part 147, Level 2]
  - 24.03 Inspect, check, service, troubleshoot, and repair engine lubrication systems. [FAA FAR Part 147, Level 3]
- 25.0 Maintain ignition systems--The student will be able to:
- 25.01 Overhaul magneto and ignition harness. [FAA FAR Part 147, Level 2]
  - 25.02 Inspect, service, troubleshoot, and repair reciprocating and turbine engine ignition systems and components. [FAA FAR Part 147, Level 2]
  - 25.03 Inspect, service, troubleshoot, and repair turbine engine electrical starting systems. [FAA FAR Part 147, Level 3]
  - 25.04 Inspect, service, and troubleshoot turbine engine pneumatic starting systems. [FAA FAR Part 147, Level 1]

**Course Number: AMT0721**

**Occupational Completion Point: B**

**Aviation Maintenance Technician With FAA Powerplant Rating (1 Of 2) – 480 Hours – SOC Code 49-3011**

- 26.0 Maintain-fuel metering systems--The student will be able to:
- 26.01 Troubleshoot and adjust turbine engine fuel-metering systems and electronic-engine fuel controls. [FAA FAR Part 147, Level 1]
  - 26.02 Overhaul carburetor. [FAA FAR Part 147, Level 2]
  - 26.03 Repair engine fuel-metering system components. [FAA FAR Part 147, Level 2]

- 26.04 Inspect, check, service, troubleshoot, and repair reciprocating and turbine engine fuel-metering systems. [FAA FAR Part 147, Level 3]
- 27.0 Maintain engine fuel systems--The student will be able to:
  - 27.01 Repair engine fuel system components. [FAA FAR Part 147, Level 2]
  - 27.02 Inspect, check, service, troubleshoot, and repair engine fuel systems. [FAA FAR Part 147, Level 3]
- 28.0 Maintain induction systems--The student will be able to:
  - 28.01 Inspect, check, troubleshoot, service, and repair engine ice and rain control systems. [FAA FAR Part 147, Level 2]
  - 28.02 Inspect, check, service, troubleshoot, and repair heat exchangers, superchargers, and turbine engine airflow and temperature control systems. [FAA FAR Part 147, Level 1]
  - 28.03 Inspect, check, service, and repair carburetor air intake and induction manifolds. [FAA FAR Part 147, Level 3]
- 29.0 Maintain engine cooling systems--The student will be able to:
  - 29.01 Repair engine cooling system components. [FAA FAR Part 147, Level 2]
  - 29.02 Inspect, check, troubleshoot, service, and repair engine cooling systems. [FAA FAR Part 147, Level 3]
- 30.0 Maintain engine exhaust and reverser systems--The student will be able to:
  - 30.01 Repair engine exhaust system components. [FAA FAR Part 147, Level 2]
  - 30.02 Inspect, check, troubleshoot, service, and repair engine exhaust systems. [FAA FAR Part 147, Level 3]
  - 30.03 Troubleshoot and repair engine thrust reverser systems and related components. [FAA FAR Part 147, Level 1]
- 31.0 Maintain aircraft propellers--The student will be able to:
  - 31.01 Inspect, check, service, and repair propeller synchronizing and ice control systems. [FAA FAR Part 147, Level 1]
  - 31.02 Identify and select propeller lubricants. [FAA FAR Part 147, Level 2]
  - 31.03 Balance propellers. [FAA FAR Part 147, Level 1]
  - 31.04 Repair propeller control system components. [FAA FAR Part 147, Level 2]
  - 31.05 Inspect, check, service, and repair fixed-pitch, constant-speed, feathering propellers, and propeller-governing systems. [FAA FAR Part 147, Level 3]
  - 31.06 Install, troubleshoot, and remove propellers. [FAA FAR Part 147, Level 3]
  - 31.07 Repair aluminum alloy propeller blades. [FAA FAR Part 147, Level 3]
- 32.0 Demonstrate knowledge of Federal Aviation Administration Powerplant Licensing requirements--The student will be able to:
  - 32.01 Explain the requirements for obtaining FAA authorization to take the FAA Powerplant examinations.



33.0 Demonstrate employability skills for an Aviation Maintenance Technician (AMT) with an FAA Powerplant Rating--The student will be able to:

- 33.01 Conduct a job search for an AMT position.
- 33.02 Secure information about the requirements for an AMT in a particular firm.
- 33.03 Identify documents that may be required when applying for an AMT position.
- 33.04 Complete a job-application form correctly.
- 33.05 Demonstrate competency in job-interview techniques.
- 33.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other employees.
- 33.07 Identify or adopt acceptable AMT work habits.
- 33.08 Demonstrate knowledge of how to make job changes appropriately.
- 33.09 Demonstrate acceptable employee health habits.
- 33.10 Demonstrate knowledge of the "Right-to-Know" law.

34.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation powerplant maintenance occupations--The student will be able to:

- 34.01 Define entrepreneurship.
- 34.02 Describe the importance of entrepreneurship to the aviation maintenance industry.
- 34.03 List the advantages and disadvantages of aviation maintenance business ownership.
- 34.04 Identify the risks involved in ownership of an aviation maintenance business.
- 34.05 Identify the necessary personal characteristics of a successful aviation maintenance business owner.
- 34.06 Identify the business skills needed to operate an aviation maintenance business efficiently and effectively.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aviation Maintenance General 1  
**Course Number:** 8715110  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce general hangar and shop safety, environmental concerns, mathematics, physics, basic aerodynamics, federal aviation regulations, publications and records.

06.0 Perform ground operations and servicing duties--The student will be able to:

- 06.01 Start, ground operate, move, service, and secure aircraft and identify typical ground-operations hazards. [FAA FAR Part 147, Level 2]
- 06.02 Identify and select fuels. [FAA FAR Part 147, Level 2]
- 06.03 Comply with prescribed shop and personal safety procedures.

08.0 Demonstrate mathematical skills--The student will be able to:

- 08.01 Extract roots and raise numbers to a given power. [FAA FAR Part 147, Level 3]
- 08.02 Determine areas and volumes of various geometrical shapes by solving problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.[FAA FAR Part 147, Level 3]
- 08.03 Solve ratio, proportion, and percentage problems. [FAA FAR Part 147, Level 3]
- 08.04 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers. [FAA FAR Part 147, Level 3]
- 08.05 Measure tolerances on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
- 08.06 Identify costs, prices, and taxes for the purchase and sale of materials that may be required when performing the duties of an Aviation Maintenance Technician.

09.0 Maintain forms and records--The student will be able to:

- 09.01 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records. [FAA FAR Part 147, Level 3]
- 09.02 Complete required maintenance forms, records, and inspection reports. [FAA FAR Part 147, Level 3]

10.0 Apply basic physics to aircraft systems--The student will be able to:

- 10.01 Use and understand the principles of simple machines; sound, fluid, and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight. [FAA FAR Part 147, Level 2]

- 12.0 Demonstrate the use of maintenance publications--The student will be able to:
- 12.01 Demonstrate ability to read, comprehend, and apply information contained in FAA and manufacturers' aircraft maintenance specifications, data sheets, manuals, publications, and related Federal Aviation Regulations, Airworthiness Directives, and Advisory material. [FAA FAR Part 147, Level 3]
  - 12.02 Read technical data. [FAA FAR Part 147, Level 3]
- 13.0 Interpret mechanic privileges and limitations--The student will be able to:
- 13.01 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter.[FAA FAR Part 147, Level 3]
- 15.0 Demonstrate appropriate communication skills--The student will be able to:
- 15.01 Write logical and understandable statements or phrases to accurately complete forms/invoices commonly used in business and industry.
  - 15.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 15.03 Read and follow written and oral instructions.
  - 15.04 Answer and ask questions coherently and concisely.
  - 15.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 15.06 Demonstrate appropriate telephone/communication skills.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aviation Maintenance General 2  
**Course Number:** 8715120  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce aircraft hardware and precision measuring instruments; blueprints and drawings; hand and power tools; and fluid lines and fittings.

02.0 Perform basic aircraft drawing skills--The student will be able to:

- 02.01 Use aircraft drawings, symbols, and system schematics. [FAA FAR Part 147, Level 2]
- 02.02 Draw sketches of repairs and alterations. [FAA FAR Part 147, Level 3]
- 02.03 Use blueprint information. [FAA FAR Part 147, Level 3]
- 02.04 Use graphs and charts. [FAA FAR Part 147, Level 3]

04.0 Maintain aircraft fluid lines and fittings--The student will be able to:

- 04.01 Fabricate and install rigid and flexible fluid lines and fittings. [FAA FAR Part 147, Level 3]
- 04.02 Identify and utilize special fluid-line tools.
- 04.03 Utilize proper personal safety procedures for fluid lines and fittings.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aviation Maintenance General 3  
**Course Number:** 8715130  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce basic electricity and DC electrical circuits; aircraft battery service and inspection; AC electrical circuits and solid-state circuits.

01.0 Perform basic electricity skills--The student will be able to:

- 01.01 Calculate and measure capacitance and inductance. [FAA FAR Part 147, Level 2]
- 01.02 Calculate and measure electrical power. [FAA FAR Part 147, Level 2]
- 01.03 Measure voltage, current, resistance, and continuity. [FAA FAR Part 147, Level 3]
- 01.04 Determine the relationship of voltage, current, and resistance in electrical circuits. [FAA FAR Part 147, Level 3]
- 01.05 Read and interpret aircraft electrical-circuit diagrams, including solid-state devices and logic functions. [FAA FAR Part 147, [Level 3]
- 01.06 Inspect and service batteries. [FAA FAR Part 147, Level 3]
- 01.07 Utilize proper electrical safety procedures.

11.0 Demonstrate appropriate understanding of basic science--The student will be able to:

- 11.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 11.02 Draw conclusions or make inferences from data.
- 11.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
- 11.04 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Aviation Maintenance General 4  
**Course Number:** 8715140  
**Course Credit:** 1 credit

**Course Description:**

This course is designed to introduce structural materials and processes, non-destructive inspection, aircraft cleaning and corrosion control, weight and balance, and aircraft ground operations and servicing.

03.0 Demonstrate aircraft weight and balance skills--The student will be able to:

- 03.01 Weigh aircraft.[FAA FAR Part 147, Level 2]
- 03.02 Perform complete weight-and-balance check and record data. [FAA FAR Part 147, Level 3]
- 03.03 Utilize proper personal safety procedures.

05.0 Perform aircraft materials and processes skills--The student will be able to:

- 05.01 Identify and select appropriate nondestructive testing methods. [FAA FAR Part 147, Level 1]
- 05.02 Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections. [FAA FAR Part 147, Level 2]
- 05.03 Perform basic heat-testing processes. [FAA FAR Part 147, Level 1]
- 05.04 Identify and select aircraft hardware and materials.[FAA FAR Part 147, Level 3]
- 05.05 Inspect and check welds. [FAA FAR Part 147, Level 3]
- 05.06 Perform precision measurements. [FAA FAR Part 147, Level 3]
- 05.07 Perform safety-wiring techniques.

07.0 Perform cleaning and corrosion-control operations--The student will be able to:

- 07.01 Identify and select cleaning materials. [FAA FAR Part 147, Level 3].
- 07.02 Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. [FAA FAR Part 147, Level 3]
- 07.03 Identify and utilize appropriate equipment for cleaning and corrosion control.
- 07.04 Observe appropriate personal safety procedures for corrosive chemicals.

14.0 Identify Federal Aviation Administration licensing requirements--The student will be able to:

- 14.01 Identify the information in Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for Aviation Maintenance Technician (AMT) certification and ratings.
- 14.02 Identify the FAA requirements that must be satisfied in order to display the FAA Airframe and Powerplant license.

16.0 Demonstrate employability skills as an aviation general maintenance technician helper-  
-The student will be able to:

- 16.01 Conduct a job search.
- 16.02 Secure information about a job.
- 16.03 Identify documents that may be required when applying for a job position.
- 16.04 Complete a job-application form correctly.
- 16.05 Demonstrate job-interview skills.
- 16.06 Identify appropriate responses to criticism from employer, supervisor, or other employees.
- 16.07 Identify work habits for getting and keeping a job.
- 16.08 Explain how to make job changes.
- 16.09 Explain the purpose of the Right-to-Know" law.

17.0 Demonstrate an understanding of entrepreneurship related to opportunities in aviation general maintenance occupations--The student will be able to:

- 17.01 Define entrepreneurship.
- 17.02 Describe the importance of entrepreneurship to the United States economy.
- 17.03 List the advantages and disadvantages of business ownership.
- 17.04 Identify the risks involved in ownership of a business.
- 17.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 17.06 Identify the business skills needed to operate a small business efficiently and effectively.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Medium and Heavy Duty Truck and Bus Technician  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	8742000	1470605
CIP Number	0647060501	0647060501
Grade Level	9-12, 30, 31	30, 31
Standard Length	12 Credits	1800 Hours
Teacher Certification	DIESEL MECH @7 G	DIESEL MECH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3031	49-3031
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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.



## Program Structure

This program is a planned sequence of instruction consisting of nine OCPs.

The courses after the core may be taken in any sequence. However, an individual must take the Preventive Maintenance course. The Heavy Duty Truck and Bus Technician Program may be offered at both the secondary and postsecondary adult vocational (PSAV) levels.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0101	Diesel Engine Mechanic/Technician Helper	150	49-3031
B	DIM0102	Diesel Electrical and Electronics Technician	300	49-3031
C	DIM0103	Diesel Engine Preventative Maintenance Technician	150	49-3031
D	DIM0104	Diesel Engine Technician	300	49-3031
E	DIM0105	Diesel Brakes Technician	300	49-3031
F	DIM0106	Diesel Heating and Air Conditioning Technician	150	49-3031
G	DIM0107	Diesel Steering and Suspension Technician	150	49-3031
H	DIM0108	Diesel Drivetrain Technician	150	49-3031
I	DIM0109	Diesel Hydraulics Technician	150	49-3031

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8742010	Diesel Engine Service 1	1 credit	49-3031	2
B	8742020	Diesel Engine Service 2	1 credit	49-3031	2
	8742030	Diesel Engine Service 3	1 credit	49-3031	2
	8742040	Diesel Engine Service 4	1 credit	49-3031	2
D	8742050	Diesel Engine Service 5	1 credit	49-3031	2
	8742060	Diesel Engine Service 6	1 credit	49-3031	2
E	8742070	Diesel Engine Service 7	1 credit	49-3031	2
	8742080	Diesel Engine Service 8	1 credit	49-3031	2
F	8742090	Diesel Engine Service 9	1 credit	49-3031	2
G	8742091	Diesel Engine Service 10	1 credit	49-3031	2
H	8742092	Diesel Engine Service 11	1 credit	49-3031	2
I	8742093	Diesel Engine Service 12	1 credit	49-3031	2

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan

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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Identify shop organization, management, and safety requirements.
- 02.0 Identify the basic diesel components and functions.
- 03.0 Demonstrate the use of basic tools and equipment.
- 04.0 Demonstrate shop and occupational safety procedures.
- 05.0 Identify principles, assemblies, and systems of engine operation.
- 06.0 Demonstrate the qualifications for employment
- 07.0 Demonstrate mathematics knowledge and skills.
- 08.0 Demonstrate science knowledge and skills
- 09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 10.0 General Electrical Systems Diagnosis
- 11.0 Battery Diagnosis and Repair
- 12.0 Starting System Diagnosis and Repair
- 13.0 Charging System Diagnosis and Repair
- 14.0 Lighting Systems Diagnosis and Repair
  - 14.01 Headlights, Daytime Running Lights, Parking, Clearance, Tail, Cab, and Instrument Panel Lights
  - 14.02 Stoplights, Turn Signals, Hazard Lights, and Back-up Lights
- 15.0 Gauges and Warning Devices Diagnosis and Repair
- 16.0 Related Electrical Systems
- 17.0 Demonstrate language arts knowledge and skills
- 18.0 Solve problems using critical thinking skills, creativity and innovation.
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 20.0 Engine System
  - 20.01 Engine
  - 20.02 Fuel System
  - 20.03 Air Induction and Exhaust System
  - 20.04 Cooling System
  - 20.05 Lubrication System
- 21.0 Cab and Hood
  - 21.01 Instruments and Controls
  - 21.02 Safety Equipment
  - 21.03 Hardware
  - 21.04 Heating, Ventilation, & Air Conditioning (HVAC)
- 22.0 Electrical/Electronics
  - 22.01 Battery and Starting Systems
  - 22.02 Charging System
  - 22.03 Lighting System
- 23.0 Frame and Chassis
  - 23.01 Air Brakes
  - 23.02 Hydraulic Brakes
  - 23.03 Drive Train
  - 23.04 Suspension and Steering Systems
  - 23.05 Tires and Wheels
  - 23.06 Frame and Fifth Wheel
- 24.0 Use information technology tools
- 25.0 Describe the importance of professional ethics and legal responsibilities.
- 26.0 Demonstrate personal money-management concepts, procedures, and strategies
- 27.0 General Engine Diagnosis

- 28.0 Cylinder Head and Valve Train Diagnosis and Repair
- 29.0 Engine Block Diagnosis and Repair
- 30.0 Lubrication Systems Diagnosis and Repair
- 31.0 Cooling System Diagnosis and Repair
- 32.0 Air Induction and Exhaust Systems Diagnosis and Repair
- 33.0 Fuel System Diagnosis and Repair
  - 33.01 Fuel Supply System Diagnosis and Repair
  - 33.02 Mechanical Fuel Injection Diagnosis and Repair
  - 33.03 Electronic Fuel Management System Diagnosis and Repair
- 34.0 Engine Brakes
- 35.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 37.0 Explain the importance of employability and entrepreneurship skills
- 38.0 Air Supply and Service Systems
- 39.0 Mechanical/Foundation
- 40.0 Parking Brakes
- 41.0 Hydraulic System
- 42.0 Mechanical/Foundation
- 43.0 Power Assist Units
- 44.0 Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)
- 45.0 HVAC Systems Diagnosis, Service, and Repair
- 46.0 A/C System and Component Diagnosis, Service, and Repair
  - 46.01 A/C System - General
  - 46.02 Compressor and Clutch
  - 46.03 Evaporator, Condenser, and Related Components
  - 46.04 Heating and Engine Cooling Systems Diagnosis, Service, and Repair
- 47.0 Operating Systems and Related Controls Diagnosis and Repair
  - 47.01 Electrical
  - 47.02 Air/Vacuum/Mechanical
  - 47.03 Refrigerant Recovery, Recycling, and Handling
- 48.0 Steering Systems Diagnosis and Repair
  - 48.01 Steering Column
  - 48.02 Steering Units
  - 48.03 Steering Linkage
- 49.0 Suspension Systems Diagnosis and Repair
- 50.0 Wheel Alignment Diagnosis, Adjustment, and Repair
- 51.0 Wheels and Tires Diagnosis and Repair
- 52.0 Frame Service and Repair
- 53.0 Clutch Diagnosis and Repair
- 54.0 Transmission Diagnosis and Repair
- 55.0 Driveshaft and Universal Joint Diagnosis and Repair
- 56.0 Drive Axle Diagnosis and Repair
- 57.0 General System Operation
- 58.0 Pumps
- 59.0 Filtration/ Reservoirs (Tanks)
- 60.0 Hoses, Fittings, and Connections
- 61.0 Control Valves
- 62.0 Actuators

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Medium and Heavy Duty Truck and Bus Technician**  
**PSAV Number: I470605**

**Course Number: DIM0101**

**Occupational Completion Point: A**

**Diesel Engine Mechanic/Technician Helper – 150 Hours – SOC Code 49-3031**

01.0 Identify shop organization, management, and safety requirements -- The student will be able to:

01.01 Identify basic shop organization and management regulations.

01.02 Identify required shop-safety practices.

01.03 Identify and describe shop-maintenance procedures, including precautions for handling and storing work-related 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 seals, gaskets, and fasteners.

02.03 Identify drive power train components and functions.

02.04 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility

03.0 Demonstrate the use of basic tools and equipment -- The student will be able to:

03.01 Identify and use the following correctly and safely:

a) Basic hand tools

b) Basic welding tools and equipment

c) Power tools

d) Measuring and precision tools

03.02 Read a digital multimeter

04.0 Demonstrate shop and occupational safety procedures --The student will be able to:

04.01 Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.

04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and the handling, storage, and disposal of chemicals and hazardous materials.

05.0 Identify principles, assemblies, and systems of engine operation --The student will be able to:

05.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine

05.02 Identify engine assemblies and systems.

05.03 Explain the operating principles of two-and-four-stroke-cycle engines.

05.04 Identify the equipment of two-and-four-stroke-cycle engines.

05.05 Identify governor types and their operating principles.

- 06.0 Demonstrate the qualifications for employment -- The student will be able to:
- 06.01 Demonstrate the shop organization, management, and safety requirements for a diesel engine technician.
  - 06.02 Demonstrate the use of tools and equipment required for a diesel engine technician.
  - 06.03 Demonstrate workplace communications skills required by diesel engine technician.
  - 06.04 Demonstrate the application of math and science principles required for a diesel engine technician's job tasks.
  - 06.05 Demonstrate employability skills as a diesel engine technician.
- 07.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 07.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 07.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 07.03 Construct charts/tables/graphs using functions and data. AF3.5
- 08.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 09.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 09.02 Locate, organize and reference written information from various sources. CM 3.0
  - 09.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 09.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 09.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 09.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 09.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: DIM0102**

**Occupational Completion Point: B**

**Diesel Electrical and Electronics Technician – 300 Hours – SOC Code 49-3031**

- 10.0 General electrical systems diagnosis --The student will be able to:
- 10.01 Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams. (P-1)
  - 10.02 Check continuity in electrical/electronic circuits using appropriate test equipment. (P-1)
  - 10.03 Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM). (P-1)
  - 10.04 Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) or clamp-on ammeter. (P-1)

- 10.05 Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM). (P-1)
  - 10.06 Find shorts, grounds, and opens in electrical/electronic circuits. (P-1)
  - 10.07 Diagnose parasitic (key-off) battery drain problems. (P-1)
  - 10.08 Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed. (P-2)
  - 10.09 Inspect and test spike suppression diodes/resistors; replace as needed. (P-3)
- 11.0 Battery diagnosis and repair -- The student will be able to:
- 11.01 Perform battery load test; determine needed action. (P-1)
  - 11.02 Determine battery state of charge using an open circuit voltage test. (P-2)
  - 11.03 Inspect, clean, and service battery; replace as needed. (P-2)
  - 11.04 Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed. (P-2)
  - 11.05 Charge battery using slow or fast charge method as appropriate. (P-2)
  - 11.06 Inspect, test, and clean battery cables and connectors; repair or replace as needed. (P-1)
  - 11.07 Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures. (P-1)
  - 11.08 Perform battery capacitance test; determine needed action. (P-2)
- 12.0 Starting system diagnosis and repair-- The student will be able to:
- 12.01 Perform starter current draw test; determine needed action. (P-3)
  - 12.02 Perform starter circuit cranking voltage and voltage drop tests; determine needed action. (P-1)
  - 12.03 Inspect, test, and replace components (key switch, push button and/or magnetic switch) and wires in the starter control circuit. (P-2)
  - 12.04 Inspect, test, and replace starter relays and solenoids/switches. (P-2)
  - 12.05 Remove and replace starter; inspect flywheel ring gear or flex plate. (P-3)
- 13.0 Charging system diagnosis and repair --The student will be able to:
- 13.01 Diagnose instrument panel mounted volt meters and/or indicator lamps that show a no charge, low charge, or overcharge condition; determine needed action. (P-1)
  - 13.02 Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action. (P-1)
  - 13.03 Inspect, adjust, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment. (P-1)
  - 13.04 Perform charging system voltage and amperage output test; determine needed action. (P-1)
  - 13.05 Perform charging circuit voltage drop tests; determine needed action. (P-1)
  - 13.06 Remove and replace alternator. P-3
  - 13.07 Inspect, repair, or replace connectors and wires in the charging circuit. (P-2)
  - 13.08 Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action. (P-1)
- 14.0 Lighting Systems Diagnosis And Repair



14.01 Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights --The student will be able to:

- 14.01.1 Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation. (P-1)
- 14.01.2 Test, aim, and replace headlights. (P-1)
- 14.01.3 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed. (P-1)
- 14.01.4 Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays and wires of parking, clearance, and taillight circuits; repair or replace as needed. (P-1)
- 14.01.5 Inspect and test instrument panel light circuit switches, relays, bulbs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed. (P-2)
- 14.01.6 Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-2)
- 14.01.7 Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed. (P-1)

14.02 Stoplights, turn signals, hazard lights, and back-up lights --The student will be able to:

- 14.02.1 Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-1)
- 14.02.2 Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-1)
- 14.02.3 Inspect, test, and adjust backup lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, and wires; repair or replace as needed. (P-2)

15.0 Gauges and warning devices diagnosis and repair --The student will be able to:

- 15.01 Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action. (P-1)
- 15.02 Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action. (P-2)
- 15.03 Diagnose the cause of data bus-driven gauge malfunctions; determine needed action. (P-3)
- 15.04 Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed. (P-2)
- 15.05 Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed. (P-2)
- 15.06 Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems. (P-2)

16.0 Related electrical systems --The student will be able to:

- 16.01 Diagnose the cause of constant, intermittent, or no horn operation; determine needed action. (P-2)
  - 16.02 Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed. (P-2)
  - 16.03 Diagnose the cause of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action. (P-2)
  - 16.04 Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed. (P-2)
  - 16.05 Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed. (P-2)
  - 16.06 Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.07 Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.08 Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.09 Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.10 Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action. (P-3)
  - 16.11 Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed. (P-3)
  - 16.12 Inspect block heaters; determine needed repairs. (P-2)
  - 16.13 Inspect and test cruise control electrical components; repair or replace as needed. (P-3)
  - 16.14 Inspect and test engine cooling fan electrical control components; repair or replace as needed. (P-2)
  - 16.15 Diagnose cause of data buss communication problems; determine needed action.(P-3)
- 17.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 17.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 17.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 17.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 18.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 18.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 18.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 18.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 18.04 Conduct technical research to gather information necessary for decision-making.PS 4.0
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:

- 19.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 19.02 Explain emergency procedures to follow in response to workplace accidents.
- 19.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: DIM0103****Occupational Completion Point: C****Diesel Engine Preventative Maintenance Technician – 150 Hours – SOC Code 49-3031**

## 20.0 Engine System

20.01 Engine -- The student will be able to:

- 20.01.1 Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed (P-1)
- 20.01.2 Inspect vibration damper. (P-1)
- 20.01.3 Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment. (P-1)
- 20.01.4 Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off). (P-1)
- 20.01.5 Inspect engine mounts for looseness and deterioration. (P-1)
- 20.01.6 Check engine for oil, coolant, air, fuel and exhaust leaks (Engine Running). (P-1)
- 20.01.7 Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM). (P-1)

20.02 Fuel system -- The student will be able to:

- 20.02.1 Check fuel tanks, mountings, lines, caps, and vents. (P-1)
- 20.02.2 Inspect throttle linkages and return springs. (P-1)
- 20.02.3 Drain water from fuel system. (P-1)
- 20.02.4 Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system. (P-1)

20.03 Air induction and exhaust system--The student will be able to:

- 20.03.1 Check exhaust system mountings for looseness and damage. (P-1)
- 20.03.2 Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system if equipped. (P-1)
- 20.03.3 Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks. (P-1)
- 20.03.4 Inspect turbocharger for leaks; check mountings and connections. (P-1)
- 20.03.5 Check operation of engine compression/exhaust brake. (P-1)
- 20.03.6 Service or replace air filter as needed; check and reset air filter restriction indicator. (P-1)

20.04 Cooling system -- The student will be able to:

- 20.04.1 Check operation of fan clutch. (P-1)

- 20.04.2 Inspect radiator (including air flow restriction, leaks, and damage) and mountings. (P-1)
- 20.04.3 Inspect fan assembly and shroud. (P-1)
- 20.04.4 Pressure test cooling system and radiator cap. (P-1)
- 20.04.5 Inspect coolant hoses and clamps. (P-1)
- 20.04.6 Inspect coolant recovery system. (P-1)
- 20.04.7 Check coolant for contamination, supplemental coolant additives (SCA) concentration, and protection level (freeze point). (P-1)
- 20.04.8 Service coolant filter/conditioner. (P-1)
- 20.04.9 Inspect water pump for leaks and bearing play. (P-1)

20.05 Lubrication system -- The student will be able to:

- 20.05.1 Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs. (P-1)
- 20.05.2 Take an engine oil sample. (P-1)

21.0 Cab And Hood

21.01 Instruments and controls -- The student will be able to:

- 21.01.1 Inspect key condition and operation of ignition switch. (P-1)
- 21.01.2 Check warning indicators. (P-1)
- 21.01.3 Check instruments; record oil pressure and system voltage. (P-1)
- 21.01.4 Check mechanical, electronic, and emergency shut down operation. (P-1)
- 21.01.5 Check mechanical and electronic engine speed controls. (P-1)
- 21.01.6 Check heater, ventilation, and air conditioning (HVAC) controls. (P-1)
- 21.01.7 Check operation of all accessories. (P-1)
- 21.01.8 Using diagnostic tool or on-board diagnostic system; extract engine monitoring information. (P-1)

21.02 Safety equipment -- The student will be able to:

- 21.02.1 Check operation of electric/air horns and back-up warning devices (P-1)
- 21.02.2 Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals. (P-1)
- 21.02.3 Inspect seat belts and sleeper restraints. (P-1)
- 21.02.4 Inspect wiper blades and arms. (P-1)

21.03 Hardware -- The student will be able to:

- 21.03.1 Check wiper and washer operation. (P-1)
- 21.03.2 Inspect windshield glass for cracks or discoloration; check sun visor. (P-1)
- 21.03.3 Check seat condition, operation, and mounting. (P-1)
- 21.03.4 Check door glass and window operation. (P-1)
- 21.03.5 Inspect steps and grab handles. (P-1)
- 21.03.6 Inspect mirrors, mountings, brackets, and glass. (P-1)
- 21.03.7 Record all observed physical damage. (P-1)

- 21.03.8 Lubricate all cab and hood grease fittings. (P-1)
- 21.03.9 Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables. (P-1)
- 21.03.10 Inspect cab mountings, hinges, latches, linkages and ride height; service as needed. (P-1)
- 21.03.11 Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed. (P-1)

21.04 Heating, ventilation, & air conditioning (HVAC) -- The student will be able to:

- 21.04.1 Inspect A/C condenser and lines for condition and visible leaks; check mountings. (P-1)
- 21.04.2 Inspect A/C compressor and lines for condition and visible leaks; check mountings. (P-1)
- 21.04.3 Check A/C system condition and operation; check A/C monitoring system, if applicable. (P-1)
- 21.04.4 Check HVAC air inlet filters and ducts; service as needed. (P-1)

22.0 Electrical/Electronics

22.01 Battery and starting systems -- The student will be able to:

- 22.01.1 Inspect battery box(es), cover(s), and mountings. (P-1)
- 22.01.2 Inspect battery hold-downs, connections, cables, and cable routing; service as needed. (P-1)
- 22.01.3 Check/record battery state-of-charge (open circuit voltage) and condition. (P-1)
- 22.01.4 Perform battery test (load and/or capacitance). (P-1)
- 22.01.5 Inspect starter, mounting, and connections. (P-1)
- 22.01.6 Engage starter; check for unusual noises, starter drag, and starting difficulty. (P-1)

22.02 Charging system -- The student will be able to:

- 22.02.1 Inspect alternator, mountings, wiring and wiring routing; determine needed action. (P-1)
- 22.02.2 Perform alternator current output test. (P-1)
- 22.02.3 Perform alternator voltage output test. (P-1)

22.03 Lighting system -- The student will be able to:

- 22.03.1 Check operation of interior lights; determine needed action. (P-1)
- 22.03.2 Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action. (P-1)
- 22.03.3 Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action. (P-1)

23.0 Frame And Chassis

23.01 Air brakes -- The student will be able to:

- 23.01.1 Check parking brake operation. (P-1)
- 23.01.2 Record air governor cut-out setting (psi). (P-1)
- 23.01.3 Check air drier drain valve operation. (P-1)
- 23.01.4 Check air system for leaks (brakes released). (P-1)
- 23.01.5 Check air system for leaks (brakes applied). (P-1)
- 23.01.6 Test one-way and double-check valves. (P-1)
- 23.01.7 Check low air pressure warning devices. (P-1)
- 23.01.8 Check air governor cut-in pressure. (P-1)
- 23.01.9 Check emergency (spring) brake control/modulator valve, if applicable. (P-1)
- 23.01.10 Check tractor protection valve. (P-1)
- 23.01.11 Test air pressure build-up time. (P-1)
- 23.01.12 Inspect coupling air lines, holders, and gladhands. (P-1)
- 23.01.13 Check brake chambers and air lines for secure mounting and damage. (P-1)
- 23.01.14 Service air drier. (P-1)
- 23.01.15 Inspect and record brake lining/pad condition, thickness, and contamination. (P-1)
- 23.01.16 Inspect and record condition of brake drums/rotors. (P-1)
- 23.01.17 Check operation of brake manual slack adjusters; adjust as needed. (P-1)
- 23.01.18 Check operation and adjustment of brake automatic slack adjusters. (P-1)
- 23.01.19 Lubricate all brake component grease fittings. (P-1)
- 23.01.20 Check condition and operation of hand brake (trailer) control valve. (P-1)
- 23.01.21 Perform antilock brake system (ABS) operational system self-test. (P-1)
- 23.01.22 Drain air tanks and check for contamination. (P-1)
- 23.01.23 Check condition of pressure relief (safety) valves (P-1)

23.02 Hydraulic brakes -- The student will be able to:

- 23.02.1 Check master cylinder fluid level and condition. (P-1)
- 23.02.2 Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage. (P-1)
- 23.02.3 Check parking brake operation; inspect parking brake application and holding devices; adjust as needed. (P-1)
- 23.02.4 Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift). (P-1)
- 23.02.5 Inspect wheel cylinders/calipers for leakage and damage. (P-1)
- 23.02.6 Inspect power brake booster(s), hoses; and check/control valves; check power brake booster, reservoir fluid level and condition. P-1
- 23.02.7 Inspect and record brake lining/pad condition and thickness, and contamination. (P-1)
- 23.02.8 Inspect and record condition of brake drums/rotors. (P-1)
- 23.02.9 Adjust drum brakes. (P-1)

23.03 Drive train -- The student will be able to:

- 23.03.1 Check operation of clutch, clutch brake, and gearshift. (P-1)
- 23.03.2 Check clutch linkage/cable for looseness or binding, if applicable. (P-1)

- 23.03.3 Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable. (P-1)
- 23.03.4 Check clutch adjustment; adjust as needed. (P-1)
- 23.03.5 Check transmission case, seals, filter, hoses, and cooler for cracks and leaks. (P-1)
- 23.03.6 Inspect transmission breather. (P-1)
- 23.03.7 Inspect transmission mounts. (P-1)
- 23.03.8 Check transmission oil level, type, and condition. (P-1)
- 23.03.9 Inspect U-joints, yokes, drive lines, and center bearings for looseness, damage, and proper phasing. (P-1)
- 23.03.10 Inspect axle housing(s) for cracks and leaks. (P-1)
- 23.03.11 Inspect axle breather(s). (P-1)
- 23.03.12 Lubricate all drive train grease fittings. (P-1)
- 23.03.13 Check drive axle(s) oil level, type, and condition. (P-1)
- 23.03.14 Change drive axle(s) oil and filter; check and clean magnetic plugs.(P-1)
- 23.03.15 Check two-speed axle unit operation and oil level. (P-1)
- 23.03.16 Change transmission oil and filter; check and clean magnetic plugs.(P-1)
- 23.03.17 Check interaxle differential lock operation. (P-1)
- 23.03.18 Check range shift operation. (P-1)

23.04 Suspension and steering systems -- The student will be able to:

- 23.04.1 Check steering wheel operation for free play or binding. (P-1)
- 23.04.2 Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level. (P-1)
- 23.04.3 Change power steering fluid and filter. (P-1)
- 23.04.4 Inspect steering gear for leaks and secure mounting. (P-1)
- 23.04.5 Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, linkage, and linkage-assist power steering cylinders. (P-1)
- 23.04.6 Check king pin wear. (P-1)
- 23.04.7 Check wheel bearings for looseness and noise. (P-1)
- 23.04.8 Check oil level and condition in all non-drive hubs; check for leaks. (P-1)
- 23.04.9 Remove and inspect wheel bearings; reassemble and adjust. (P-1)
- 23.04.10 Inspect springs, hangers, shackles, spring U-bolts, and insulators. (P-1)
- 23.04.11 Inspect shock absorbers for leaks and secure mounting. (P-1)
- 23.04.12 Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage. (P-1)
- 23.04.13 Check and record suspension ride height. (P-1)
- 23.04.14 Lubricate all suspension and steering grease fittings. (P-1)
- 23.04.15 Check toe adjustment. (P-1)
- 23.04.16 Check tandem axle alignment and spacing. (P-1)
- 23.04.17 Check axle locating components (radius, torque, and/or track rods). (P-1)

23.05 Tires and wheels -- The student will be able to:

- 23.05.1 Inspect tires for irregular wear patterns and proper mounting of directional tires. (P-1)
- 23.05.2 Inspect tires for cuts, cracks, bulges, and sidewall damage. (P-1)
- 23.05.3 Inspect valve caps and stems; replace as needed. (P-1)
- 23.05.4 Measure and record tread depth; probe for imbedded debris. (P-1)
- 23.05.5 Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications. (P-1)
- 23.05.6 Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed. (P-1)
- 23.05.7 Retorque lugs in accordance with manufacturer's specifications. (P-1)
- 23.05.8 Inspect wheels and spacers for cracks or damage. (P-1)
- 23.05.9 Check tire matching (diameter and tread) on dual tire installations. (P-1)

23.06 Frame and fifth wheel -- The student will be able to:

- 23.06.1 Inspect fifth wheel mounting bolts, air lines, and locks. (P-1)
- 23.06.2 Test operation of fifth wheel locking device; adjust if necessary. (P-1)
- 23.06.3 Check mud flaps and brackets. (P-1)
- 23.06.4 Check pintle hook assembly and mounting. (P-1)
- 23.06.5 Lubricate all fifth wheel grease fittings and plate. (P-1)
- 23.06.6 Inspect frame and frame members for cracks and damage. (P-1)

24.0 Use information technology tools. -- The students will be able to:

- 24.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 24.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 24.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 24.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

25.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 25.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 25.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 25.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 25.04 Interpret and explain written organizational policies and procedures. ELR 2.0

26.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- 26.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 26.02 Describe the effect of money management on personal and career goals. FL 3.0
- 26.03 Develop a personal budget and financial goals. FL3.1



26.04	Complete financial instruments for making deposits and withdrawals.	FL3.2
26.05	Maintain financial records.	FL3.3
26.06	Read and reconcile financial statements.	FL3.4
26.07	Research, compare and contrast investment opportunities.	

**Course Number: DIM0104****Occupational Completion Point: D****Diesel Engine Technician – 300 Hours – SOC Code 49-3031**27.0 General engine diagnosis -- The student will be able to:

- 27.01 Inspect fuel, oil, and coolant levels and condition, and consumption; determine needed action. (P-1)
- 27.02 Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action. (P-1)
- 27.03 Interpret engine noises; determine needed action. (P-2)
- 27.04 Observe engine exhaust smoke color and quantity; determine needed action. (P-1)
- 27.05 Perform air intake system restriction and leakage tests; determine needed action. (P-1)
- 27.06 Perform intake manifold pressure (boost) test; determine needed action. (P-1)
- 27.07 Perform exhaust back pressure test; determine needed action. (P-2)
- 27.08 Perform crankcase pressure test; determine needed action. (P-1)
- 27.09 Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action. (P-1)
- 27.10 Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action. (P-1)
- 27.11 Diagnose engine vibration problems; determine needed action. (P-2)
- 27.12 Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action. (P-1)
- 27.13 Perform cylinder compression test; determine needed action. (P-3)

28.0 Cylinder head and valve train diagnosis and repair -- The student will be able to:

- 28.01 Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly. (P-1)
- 28.02 Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action. (P-1)
- 28.03 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-1)
- 28.04 Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action. (P-3)
- 28.05 Measure valve head height relative to deck, valve face-to-seat contact; determine needed action. (P-3)
- 28.06 Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action. (P-3)
- 28.07 Inspect and adjust valve bridges (crossheads) and guides; perform needed action. (P-2)
- 28.08 Reassemble cylinder head. (P-3)
- 28.09 Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash. (P-2)

- 28.10 Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; perform needed action. (P-2)
- 28.11 Inspect cam followers; perform needed action. (P-2)
- 28.12 Adjust valve clearance. (P-1)

29.0 Engine block diagnosis and repair -- The student will be able to:

- 29.01 Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings. (P-1)
- 29.02 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-3)
- 29.03 Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action. (P-3)
- 29.04 Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action. (P-2)
- 29.05 Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion). (P-2)
- 29.06 Inspect in-block camshaft bearings for wear and damage; determine needed action. (P-3)
- 29.07 Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play. (P-3)
- 29.08 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)
- 29.09 Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play. (P-2)
- 29.10 Inspect, install, and time gear train; measure gear backlash; determine needed action. (P-3)
- 29.11 Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action. (P-2)
- 29.12 Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons. (P-2)
- 29.13 Assemble pistons and connecting rods; install in block; install rod bearings and check clearances. (P-2)
- 29.14 Check condition of piston cooling jets (nozzles); determine needed action. P-3
- 29.15 Inspect and measure crankshaft vibration damper; determine needed action. (P-3)
- 29.16 Inspect, install, and align flywheel housing. (P-3)
- 29.17 Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action. (P-3)

30.0 Lubrication systems diagnosis and repair -- The student will be able to:

- 30.01 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action. (P-1)
- 30.02 Check engine oil level, condition, and consumption; determine needed action. (P-1)
- 30.03 Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action. (P-3)

- 30.04 Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action. (P-3)
  - 30.05 Inspect, clean, and test oil cooler and components; determine needed action. (P-3)
  - 30.06 Inspect turbocharger lubrication system; determine needed action. (P-2)
  - 30.07 Determine proper lubricant and perform oil and filter change. (P-1)
- 31.0 Cooling system diagnosis and repair -- The student will be able to:
- 31.01 Check engine coolant type, level, condition, and consumption; determine needed action. (P-1)
  - 31.02 Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action. (P-2)
  - 31.03 Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment. (P-1)
  - 31.04 Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed. (P-2)
  - 31.05 Test coolant for freeze protection and additive package concentration; adjust as needed. (P-1)
  - 31.06 Recover, flush, and refill with recommended coolant/additive package; bleed cooling system. (P-1)
  - 31.07 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed. (P-1)
  - 31.08 Inspect water pump and hoses; replace as needed. (P-1)
  - 31.09 Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action. (P-1)
  - 31.10 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed. (P-2)
- 32.0 Air induction and exhaust systems diagnosis and repair -- The student will be able to:
- 32.01 Inspect turbocharger(s), wastegate, and piping systems; determine needed action. (P-2)
  - 32.02 Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed. (P-1)
  - 32.03 Remove and reinstall turbocharger/wastegate assembly. (P-2)
  - 32.04 Inspect intake manifold, gaskets, and connections; replace as needed. (P-3)
  - 32.05 Inspect, clean, and test charge air cooler assemblies; replace as needed. (P-2)
  - 32.06 Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed. (P-2)
  - 32.07 Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action. (P-2)
- 33.0 Fuel System Diagnosis And Repair
- 33.01 Fuel supply system diagnosis and repair -- The student will be able to:
- 33.01.1 Check fuel level, quality, and consumption; determine needed action. (P-1)
  - 33.01.2 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action. (P-1)

- 33.01.3 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)
- 33.01.4 Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action. (P-1)
- 33.01.5 Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump. (P-1)

33.02 Mechanical fuel injection diagnosis and repair -- The student will be able to:

- 33.02.1 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time a distributor (rotary) type injection pump; determine needed action. (P-3)
- 33.02.2 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time an in-line type injection pump; determine needed action. (P-3)
- 33.02.3 Inspect and adjust throttle control linkage; determine needed action. (P-3)
- 33.02.4 Inspect air/fuel ratio control systems; determine needed action. (P-3)
- 33.02.5 Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action. (P-3)
- 33.02.6 Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed. (P-3)

33.03 Electronic fuel management system diagnosis and repair -- The student will be able to:

- 33.03.1 Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action. (P-1)
- 33.03.2 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action. (P-1)
- 33.03.3 Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams). (P-1)
- 33.03.4 Inspect and replace electrical connector terminals, seals, and locks. (P-2)
- 33.03.5 Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed. (P-1)
- 33.03.6 Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters. (P-1)
- 33.03.7 Inspect, test, and adjust electronic unit injectors (EUI); determine needed action. (P-2)
- 33.03.8 Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable). (P-2)
- 33.03.9 Perform cylinder contribution test utilizing recommended electronic diagnostic tool. (P-1)
- 33.03.10 Perform engine timing sensor calibration (if applicable). (P-3)

- 33.03.11 Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action. (P-2)
- 33.03.12 Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI)-high pressure oil supply and control system; determine needed action. (P-2)
- 33.03.13 Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action. (P-2)
- 33.03.14 Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action. (P-2)
- 33.03.15 Perform on-engine inspections and tests on common rail type injection systems; determine needed action. (P-3)

34.0 Engine brakes -- The student will be able to:

- 34.01 Inspect and adjust engine compression/exhaust brakes; determine needed action. (P-2)
- 34.02 Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed. (P-3)
- 34.03 Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed. (P-3)

35.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 35.01 Describe the nature and types of business organizations. SY 1.0
- 35.02 Explain the effect of key organizational systems on performance and quality.
- 35.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 35.04 Explain the impact of the global economy on business organizations.

36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -  
- The students will be able to:

- 36.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 36.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 36.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 36.04 Employ mentoring skills to inspire and teach others. LT 5.0

37.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 37.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 37.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 37.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 37.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 37.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 37.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 37.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 37.08 Research the benefits of ongoing professional development. ECD 9.0

- 37.09 Examine and describe entrepreneurship opportunities as a career planning option.  
ECD 10.0

**Course Number: DIM0105**

**Occupational Completion Point: E**

**Diesel Brakes Technician – 300 Hours – SOC Code 49-3031**

**Air Brakes Diagnosis and Repair**

38.0 Air supply and service systems -- The student will be able to:

- 38.01 Diagnose poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determine needed action. (P-1)
- 38.02 Check air system build-up time; determine needed action. (P-1)
- 38.03 Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action. (P-1)
- 38.04 Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed. (P-1)
- 38.05 Inspect compressor drive gear and coupling; replace as needed. (P-3)
- 38.06 Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed. P-2
- 38.07 Inspect and test system pressure controls: governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings; replace as needed. P-2
- 38.08 Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed. (P-1)
- 38.09 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)
- 38.10 Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed. (P-1)
- 38.11 Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed. (P-1)
- 38.12 Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed. (P-1)
- 38.13 Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed. (P-1)
- 38.14 Inspect and test brake relay valve; replace as needed. (P-1)
- 38.15 Inspect and test quick release valves; replace as needed. (P-1)
- 38.16 Inspect and test front and rear axle limiting (proportioning) valves; replace as needed. (P-3)
- 38.17 Inspect and test tractor protection valve; replace as needed. (P-1)
- 38.18 Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed. (P-1)
- 38.19 Inspect and test low pressure warning devices, wiring, and connectors; replace as needed. (P-1)
- 38.20 Inspect and test air pressure gauges, lines, and fittings; replace as needed. (P-2)

39.0 Mechanical/foundation -- The student will be able to:

- 39.01 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)
- 39.02 Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed. (P-1)
- 39.03 Inspect and service manual and automatic slack adjusters; perform needed action. (P-1)
- 39.04 Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs; replace as needed (P-1)
- 39.05 Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs. (P-3)
- 39.06 Inspect and measure brake shoes, linings, or pads; perform needed action. (P-1)
- 39.07 Inspect and measure brake drums or rotors; perform needed action. (P-1)

40.0 Parking brakes -- The student will be able to:

- 40.01 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)
- 40.02 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed. (P-1)
- 40.03 Inspect and test parking (spring) brake application and release valve; replace as needed. (P-2)
- 40.04 Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations. (P-1)

### Hydraulic Brakes Diagnosis and Repair

41.0 Hydraulic system -- The student will be able to:

- 41.01 Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action. (P-1)
- 41.02 Check and adjust brake pedal pushrod length. (P-3)
- 41.03 Inspect and test master cylinder for internal/external leaks and damage; replace as needed. (P-1)
- 41.04 Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed. (P-1)
- 41.05 Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed. (P-2)
- 41.06 Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed. (P-2)
- 41.07 Inspect and clean wheel cylinders; replace as needed. (P-1)
- 41.08 Inspect and clean disc brake caliper assemblies; replace as needed. (P-1)
- 41.09 Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type. (P-1)
- 41.10 Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed. (P-1)

42.0 Mechanical/foundation -- The student will be able to:

- 42.01 Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action. (P-1)
- 42.02 Inspect and measure brake drums and rotors; perform needed action. (P-1)

- 42.03 Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action. (P-1)
  - 42.04 Inspect and measure disc brake pads/linings; inspect mounting hardware; perform needed action. (P-1)
  - 42.05 Check parking brake operation; inspect parking brake applications and holding devices; adjust and replace as needed. (P-1)
- 43.0 Power assist units -- The student will be able to:
- 43.01 Diagnose poor stopping problems caused by the brake assist (booster) system; determine needed action. (P-2)
  - 43.02 Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type. (P-2)
  - 43.03 Check emergency (back-up, reserve) brake assist system. (P-2)
- 44.0 Air and hydraulic antilock brake systems (abs) and automatic traction control (ATC) -- The student will be able to:
- 44.01 Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action. (P-1)
  - 44.02 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action. (P-1)
  - 44.03 Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action. (P-1)
  - 44.04 Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action. (P-1)
  - 44.05 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).(P-1)
  - 44.06 Bleed the ABS hydraulic circuits following manufacturers' procedures. (P-2)
  - 44.07 Observe automatic traction control (ATC) warning light operation; determine needed action. (P-3)
  - 44.08 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)

**Course Number: DIM0106**

**Occupational Completion Point: F**

**Diesel Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3031**

- 45.0 HVAC systems diagnosis, service, and repair -- The student will be able to:
- 45.01 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action. (P-1)
  - 45.02 Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action. (P-1)
  - 45.03 Identify system type and components (cycling clutch orifice tube - CCOT, expansion valve) and conduct performance test(s) on HVAC systems;determine needed action. (P-1)



## 46.0 A/C System And Component Diagnosis, Service, And Repair

46.01 A/C system – general -- The student will be able to:

- 46.01.1 Diagnose the cause of temperature control problems in the A/C system; determine needed action. (P-1)
- 46.01.2 Identify refrigerant type and check for contamination; determine needed action. (P-2)
- 46.01.3 Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action. (P-1)
- 46.01.4 Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action. (P-1)
- 46.01.5 Perform A/C system leak test; determine needed action. (P-1)
- 46.01.6 Evacuate A/C system using appropriate equipment. (P-1)
- 46.01.7 Internally clean contaminated A/C system components and hoses. (P-2)
- 46.01.8 Charge A/C system with refrigerant. (P-1)
- 46.01.9 Identify lubricant type needed for system application. (P-1)

46.02 Compressor and clutch -- The student will be able to:

- 46.02.1 Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action. (P-1)
- 46.02.2 Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices. (P-2)
- 46.02.3 Inspect, and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment. (P-1)
- 46.02.4 Inspect, test, service, and replace A/C compressor clutch components or assembly. (P-3)
- 46.02.5 Inspect and correct A/C compressor lubricant level (if applicable). (P-2)
- 46.02.6 Inspect, test, and replace A/C compressor. (P-2)
- 46.02.7 Inspect, repair, or replace A/C compressor mountings and hardware. (P-2)

46.03 Evaporator, condenser, and related components -- The student will be able to:

- 46.03.1 Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses. (P-1)
- 46.03.2 Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action. (P-1)
- 46.03.3 Inspect A/C condenser for proper air flow. (P-1)
- 46.03.4 Inspect and test A/C system condenser and mountings; determine needed action. (P-2)
- 46.03.5 Inspect and replace receiver/drier or accumulator/drier. (P-1)
- 46.03.6 Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action. (P-3)
- 46.03.7 Inspect and replace orifice tube. (P-1)
- 46.03.8 Inspect and test cab/sleeper evaporator core; determine needed action. P-3

- 46.03.9 Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter. (P-1)
- 46.03.10 Identify and inspect A/C system service ports (gauge connections); determine needed action. P1
- 46.03.11 Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action. (P-2)

46.04 Heating and engine cooling systems diagnosis, service, and repair -- The student will be able to:

- 46.04.1 Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action. (P-1)
- 46.04.2 Diagnose window fogging problems; determine needed action. (P-2)
- 46.04.3 Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action. (P-1)
- 46.04.4 Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action. (P-1)
- 46.04.5 Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action. (P-1)
- 46.04.6 Inspect water pump for leaks and bearing play; determine needed action. (P-2)
- 46.04.7 Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs. (P-2)
- 46.04.8 Recover, flush and refill with recommended coolant/additive package; bleed cooling system. (P-1)
- 46.04.9 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed. (P-2)
- 46.04.10 Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action. (P-2)
- 46.04.11 Inspect and flush heater core; determine needed action. (P-2)

47.0 Operating Systems And Related Controls Diagnosis And Repair

47.01 Electrical -- The student will be able to:

- 47.01.1 Diagnose the cause of failures in HVAC electrical control systems; determine needed action. (P-1)
- 47.01.2 Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action. (P-2)
- 47.01.3 Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action. (P-2)
- 47.01.4 Inspect and test A/C-related electronic engine control systems; determine needed action. (P-2)
- 47.01.5 Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors wiring, and protection devices; determine needed action. (P-2)
- 47.01.6 Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action. (P-3)

47.01.7 Inspect and test HVAC system electrical control panel assemblies; determine needed action. (P-3)

47.02 Air/vacuum/mechanical -- The student will be able to:

- 47.02.1 Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action. (P-1)
- 47.02.2 Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action. (P-3)
- 47.02.3 Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action. (P-3)
- 47.02.4 Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action. (P-3)
- 47.02.5 Inspect and test HVAC system vacuum reservoir(s), check valve(s), and restrictors; determine needed action. (P-3)
- 47.02.6 Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action. (P-3)

47.03 Refrigerant recovery, recycling, and handling -- The student will be able to:

**NOTE: Tasks 1 through 5 should be accomplished in accordance with published EPA and appropriate SAE "J" standards for R-12, R-134a, and EPA approved refrigerant blends.**

- 47.03.1 Maintain and verify correct operation of certified equipment. (P-1)
- 47.03.2 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. (P-1)
- 47.03.3 Recycle refrigerant. (P-1)
- 47.03.4 Handle, label, and store refrigerant. (P-1)
- 47.03.5 Test recycled refrigerant for non-condensable gases. (P-1)

**Course Number: DIM0107**

**Occupational Completion Point: G**

**Diesel Steering and Suspension Technician – 150 Hours – SOC Code 49-3031**

48.0 Steering Systems Diagnosis And Repair

48.01 Steering column -- The student will be able to:

- 48.01.1 Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action. (P-1)
- 48.01.2 Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action. (P-1)
- 48.01.3 Check and adjust cab mounting and ride height. (P-3)
- 48.01.4 Center the steering wheel as needed. (P-1)
- 48.01.5 Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures. (P-1)

48.02 Steering units -- The student will be able to:

- 48.02.1 Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed action. (P-1)
- 48.02.2 Determine recommended type of power steering fluid; check level and condition; determine needed action. (P-1)
- 48.02.3 Flush and refill power steering system; purge air from system. (P-2)
- 48.02.4 Perform power steering system pressure, temperature, and flow tests; determine needed action. (P-2)
- 48.02.5 Inspect, service, or replace power steering reservoir including filter, seals, and gaskets. (P-2)
- 48.02.6 Inspect, and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment. (P-1)
- 48.02.7 Inspect, replace as required, power steering pump drive gear and coupling. (P-3)
- 48.02.8 Inspect, adjust, or replace power steering pump, mountings, and brackets. (P-3)
- 48.02.9 Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings. (P-3)
- 48.02.10 Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system). (P-3)
- 48.02.11 Inspect, adjust, repair, or replace integral type power steering gear and mountings. (P-1)
- 48.02.12 Adjust manual and automatic steering gear poppet/relief valves. (P-2)

48.03 Steering linkage -- The student will be able to:

- 48.03.1 Inspect and align pitman arm; replace as needed. (P-1)
- 48.03.2 Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed. (P-1)
- 48.03.3 Inspect steering arm and levers, and linkage pivot joints; replace as needed. (P-1)
- 48.03.4 Inspect clamps and retainers on cross tube/relay rod/centerline/tie rod; position or replace as needed. (P-1)
- 48.03.5 Check and adjust wheel stops. (P-1)
- 48.03.6 Lubricate steering linkage joints as needed. (P-1)

49.0 Suspension systems diagnosis and repair -- The student will be able to:

- 49.01 Inspect front axles, U-bolts, and nuts; determine needed action. (P-1)
- 49.02 Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action. (P-1)
- 49.03 Inspect shock absorbers, bushings, brackets, and mounts; replace as needed. (P-1)
- 49.04 Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action. (P-1)
- 49.05 Inspect torque arms, bushings, and mounts; determine needed action. (P-1)
- 49.06 Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action. P-1
- 49.07 Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed. (P-3)

- 49.08 Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed. (P-1)
- 49.09 Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed. (P-1)
- 49.10 Measure vehicle ride height; determine needed action. (P-1)
- 49.11 Diagnose rough ride problems; determine needed action. (P-3)

50.0 Wheel alignment diagnosis, adjustment, and repair -- The student will be able to:

- 50.01 Diagnose vehicle wandering, pulling, shimmy, hard steering and off-center steering wheel problem(s); adjust and repair as needed. (P-1)
- 50.02 Check camber; determine needed action. (P-2)
- 50.03 Check caster; adjust as needed. (P-2)
- 50.04 Check toe; adjust as needed. (P-1)
- 50.05 Check rear axle(s) alignment (thrust line/centerline) and tracking; adjust or repair as needed. (P-2)
- 50.06 Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action. (P-3)
- 50.07 Check front axle alignment (centerline); adjust or repair as needed. (P-2)

51.0 Wheels and tires diagnosis and repair -- The student will be able to:

- 51.01 Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action. (P-1)
- 51.02 Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action. (P-2)

52.0 Frame service and repair -- The student will be able to:

- 52.01 Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action. (P-1)
- 52.02 Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls. (P-1)
- 52.03 Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs. (P-1)
- 52.04 Inspect, install, or repair frame hangers, brackets, and crossmembers in accordance with manufacturers' recommended procedures. (P-3)
- 52.05 Inspect, repair or replace pintle hooks and draw bars. (P-1)

**Course Number: DIM0108**

**Occupational Completion Point: H**

**Diesel Drivetrain Technician – 150 Hours – SOC Code 49-3031**

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

53.0 Clutch diagnosis and repair -- The student will be able to:

- 53.01 Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action. (P-1)

- 53.02 Inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull-type assemblies); check pedal height and travel; perform needed action. (P-1)
  - 53.03 Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system. (P-2)
  - 53.04 Inspect, adjust, lubricate or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals. (P-1)
  - 53.05 Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc. (P-2)
  - 53.06 Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs. (P-1)
  - 53.07 Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action. (P-1)
  - 53.08 Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms. (P-2)
  - 53.09 Inspect and replace pilot bearing. (P-1)
  - 53.10 Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action. (P-1)
  - 53.11 Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action. (P-1)
  - 53.12 Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action. (P-1)
- 54.0 Transmission diagnosis and repair -- The student will be able to:
- 54.01 Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action. (P-1)
  - 54.02 Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action. (P-2)
  - 54.03 Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers. (P-2)
  - 54.04 Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies. (P-1)
  - 54.05 Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action. (P-3)
  - 54.06 Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed. (P-1)
  - 54.07 Check transmission fluid level and condition; determine needed service; add proper type of lubricant. (P-1)
  - 54.08 Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires. (P-2)
  - 54.09 Remove and reinstall transmission. (P-1)
  - 54.10 Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed. (P-3)
  - 54.11 Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed. (P-3)
  - 54.12 Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed. (P-3)
  - 54.13 Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed. (P-3)
  - 54.14 Inspect and/or replace reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable). (P-3)

- 54.15 Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed. (P-3)
  - 54.16 Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed. (P-3)
  - 54.17 Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed. (P-3)
  - 54.18 Inspect transmission oil filters and coolers; replace as needed. (P-2)
  - 54.19 Inspect mechanical and electronic speedometer components; determine needed action. (P-2)
  - 54.20 Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; perform needed action. (P-3)
  - 54.21 Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed. (P-1)
  - 54.22 Inspect and test transmission temperature gauge sending unit/sensor; determine needed action. (P-2)
  - 54.23 Inspect, test operation, adjust, repair, or replace automated mechanical transmission and manual electronic shift controls, shift, range and splitter solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses. (P-2)
  - 54.24 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines. (P-2)
  - 54.25 Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs. (P-2)
  - 54.26 Inspect, test operation, adjust, repair, or replace automatic transmission electronic and manual shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCE) neutral/in gear and reverse switches and wiring harnesses. (P-3)
  - 54.27 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, switches, displays and indicators, wiring harnesses. (P-2)
  - 54.28 Use appropriate diagnostic tools and procedures to diagnose automated transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs. (P-2)
- 55.0 Driveshaft and universal joint diagnosis and repair -- The student will be able to:
- 55.01 Diagnose driveshaft and universal joint noise and vibration problems; determine needed action. (P-1)
  - 55.02 Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes. (P-1)
  - 55.03 Inspect and replace driveshaft center support bearings and mounts; determine needed action. (P-1)
  - 55.04 Measure and adjust drive line angles. (P-1)
- 56.0 Drive axle diagnosis and repair -- The student will be able to:
- 56.01 Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action. (P-2)
  - 56.02 Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals. (P-1)

- 56.03 Check drive axle fluid level and condition; determine needed service; add proper type of lubricant. (P-1)
- 56.04 Remove and replace differential carrier assembly. (P-2)
- 56.05 Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings. (P-3)
- 56.06 Inspect and replace components of locking differential case assembly. (P-3)
- 56.07 Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action. (P-3)
- 56.08 Measure ring gear runout; determine needed action. (P-3)
- 56.09 Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings. (P-3)
- 56.10 Measure and adjust drive pinion bearing preload. (P-3)
- 56.11 Measure and adjust drive pinion depth. (P-3)
- 56.12 Measure and adjust side bearing preload and ring gear backlash. (P-3)
- 56.13 Check and interpret ring gear and pinion tooth contact pattern; determine needed action. (P-3)
- 56.14 Inspect, adjust, or replace ring gear thrust block/bolt. (P-3)
- 56.15 Inspect, adjust, repair, or replace planetary gear-type 2-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover, and springs. (P-3)
- 56.16 Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors. (P-3)
- 56.17 Inspect power divider (inter-axle differential) assembly; determine needed action. (P-3)
- 56.18 Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls. (P-2)
- 56.19 Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters. (P-3)
- 56.20 Inspect and replace drive axle shafts. (P-1)
- 56.21 Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action. (P-1)
- 56.22 Diagnose drive axle for wheel bearing noise and damage; perform needed action. (P-1)
- 56.23 Inspect and test drive axle temperature gauge sending unit/sensor; determine needed action. (P-2)
- 56.24 Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings. (P-1)

**Course Number: DIM0109**

**Occupational Completion Point: I**

**Diesel Hydraulics Technician – 150 Hours – SOC Code 49-3031**

**For every task in Hydraulics, 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 Hydraulics is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.**



- 57.0 General System Operation-- The student will be able to:
- 57.01 Identify system type (closed and open) and verify proper operation. (P-1)
  - 57.02 Read and interpret system diagrams and schematics. (P-1)
  - 57.03 Perform system temperature, pressure, flow, and cycle time tests; determine needed action. (P-1)
  - 57.04 Verify placement of equipment /component safety labels and placards; determine needed action. (P-1)
- 58.0 Pumps-- The student will be able to:
- 58.01 Identify system fluid type. (P-1)
  - 58.02 Identify causes of pump failure, unusual pump noises, and temperature, flow, and leakage problems; determine needed action. (P-2)
  - 58.03 Determine pump type, rotation, and drive system. (P-2)
  - 58.04 Remove and install pump; prime and/or bleed system. (P-2)
  - 58.05 Inspect pump inlet for restrictions and leaks; determine needed action. (P-2)
  - 58.06 Inspect pump outlet for restrictions and leaks; determine needed action. (P-2)
- 59.0 Filtration/ Reservoirs (Tanks) -- The student will be able to:
- 59.01 Identify type of filtration system; verify filter application and flow direction. (P-1)
  - 59.02 Service filters and breathers. (P-1)
  - 59.03 Identify causes of system contamination; determine needed action. (P-2)
  - 59.04 Take a hydraulic oil sample. (P-2)
  - 59.05 Check reservoir fluid level and condition; determine needed action. (P-1)
  - 59.06 Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines. (P-2)
- 60.0 Hoses, Fittings, and Connections-- The student will be able to:
- 60.01 Diagnose causes of component leakage, damage, and restriction; determine needed action. (P-2)
  - 60.02 Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed. (P-1)
  - 60.03 Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination. (P-2)
  - 60.04 Inspect and replace fitting seals and sealants. (P-2)
- 61.0 Control Valves-- The student will be able to:
- 61.01 Pressure test system safety relief valve; determine needed action. (P-2)
  - 61.02 Perform control valve operating pressure and flow tests; determine needed action. (P-2)
  - 61.03 Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic). (P-2)
  - 61.04 Identify causes of control valve leakage problems (internal/external); determine needed action. (P-2)
  - 61.05 Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed. (P-1)

62.0 Actuators-- The student will be able to:

**Comply with manufacturers' and industry accepted safety practices associated with equipment lock out/tag out; pressure line release; implement/support (blocked or resting on ground); and articulated cylinder devices/machinery safety locks.**

- 62.01 Identify actuator type (single/double acting, multi-stage/telescopic, and motors) (P-1)
- 62.02 Identify the cause of seal failure; determine needed repairs. (P-2)
- 62.03 Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs. (P-2)
- 62.04 Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action. (P-2)
- 62.05 Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures. (P-2)
- 62.06 Inspect actuators for dents, cracks, damage, and leakage; determine needed action. (P-2)
- 62.07 Purge and/or bleed system in accordance with manufacturers' recommended procedures. (P-1)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 1  
**Course Number:** 8742010  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

01.0 Identify shop organization, management, and safety requirements -- The student will be able to:

- 01.01 Identify basic shop organization and management regulations.
- 01.02 Identify required shop-safety practices.
- 01.03 Identify and describe shop-maintenance procedures, including precautions for handling and storing work-related chemicals and hazardous materials.

02.0 Identify the basic diesel components and functions -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1

- 02.01 Identify types of bearings and their uses.
- 02.02 Identify seals, gaskets, and fasteners.
- 02.03 Identify drive power train components and functions.
- 02.04 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility

03.0 Demonstrate the use of basic tools and equipment -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.A.1.5

- 03.01 Identify and use the following correctly and safely:
- 03.02 Basic hand tools
- 03.03 Basic welding tools and equipment
- 03.04 Power tools
- 03.05 Measuring and precision tools
- 03.06 Read a digital multimeter

04.0 Demonstrate shop and occupational safety procedures --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.E.6.6, SC.912.L.17.15

- 04.01 Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and the handling, storage, and disposal of chemicals and hazardous materials.

05.0 Identify principles, assemblies, and systems of engine operation --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.8.2, SC.912.P.8.8, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.10.4, SC.912.P.12.3, SC.912.P.12.6, and SC.912.P.12.12

- 05.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine
- 05.02 Identify engine assemblies and systems.
- 05.03 Explain the operating principles of two-and-four-stroke-cycle engines.
- 05.04 Identify the equipment of two-and-four-stroke-cycle engines.
- 05.05 Identify governor types and their operating principles.

06.0 Demonstrate the qualifications for employment -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.D.4.1

- 06.01 Demonstrate the shop organization, management, and safety requirements for a diesel engine technician.
- 06.02 Demonstrate the use of tools and equipment required for a diesel engine technician.
- 06.03 Demonstrate workplace communications skills required by diesel engine technician.
- 06.04 Demonstrate the application of math and science principles required for a diesel engine technician's job tasks.
- 06.05 Demonstrate employability skills as a diesel engine technician.

07.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

This standard supports the following Sunshine State Standards: MA.912.A.1.4, MA.912.S.3.2, MA.912.A.10.1, and MA.912.S.1.2

- 07.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 07.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 07.03 Construct charts/tables/graphs using functions and data. AF3.5

08.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.N.1.7

- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

- 09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 09.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 09.02 Locate, organize and reference written information from various sources. CM 3.0
  - 09.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 09.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 09.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 09.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 09.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 2  
**Course Number:** 8742020  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

10.0 General electrical systems diagnosis --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.A.3.1, MA.912.A.3.12, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, and SC.912.N.1.1

- 10.01 Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams. (P-1)
- 10.02 Check continuity in electrical/electronic circuits using appropriate test equipment. (P-1)
- 10.03 Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM). (P-1)
- 10.04 Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) or clamp-on ammeter. (P-1)
- 10.05 Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM). (P-1)
- 10.06 Find shorts, grounds, and opens in electrical/electronic circuits. (P-1)
- 10.07 Diagnose parasitic (key-off) battery drain problems. (P-1)
- 10.08 Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed. (P-2)
- 10.09 Inspect and test spike suppression diodes/resistors; replace as needed. (P-3)

11.0 Battery diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.10.14, SC.912.P.10.15, and SC.912.N.1.1

- 11.01 Perform battery load test; determine needed action. (P-1)
- 11.02 Determine battery state of charge using an open circuit voltage test. (P-2)
- 11.03 Inspect, clean, and service battery; replace as needed. (P-2)
- 11.04 Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed. (P-2)
- 11.05 Charge battery using slow or fast charge method as appropriate. (P-2)
- 11.06 Inspect, test, and clean battery cables and connectors; repair or replace as needed. (P-1)

- 11.07 Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures. (P-1)
- 11.08 Perform battery capacitance test; determine needed action. (P-2)

12.0 Starting system diagnosis and repair-- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P. 10.14, SC.912.P.10.15, SC.912.P.10.16

- 12.01 Perform starter current draw test; determine needed action. (P-3)
- 12.02 Perform starter circuit cranking voltage and voltage drop tests; determine needed action. (P-1)
- 12.03 Inspect, test, and replace components (key switch, push button and/or magnetic switch) and wires in the starter control circuit. (P-2)
- 12.04 Inspect, test, and replace starter relays and solenoids/switches. (P-2)
- 12.05 Remove and replace starter; inspect flywheel ring gear or flex plate. (P-3)

13.0 Charging system diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.14, and SC.912.P.10.15

- 13.01 Diagnose instrument panel mounted volt meters and/or indicator lamps that show a no charge, low charge, or overcharge condition; determine needed action. (P-1)
- 13.02 Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action. (P-1)
- 13.03 Inspect, adjust, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment. (P-1)
- 13.04 Perform charging system voltage and amperage output test; determine needed action. (P-1)
- 13.05 Perform charging circuit voltage drop tests; determine needed action. (P-1)
- 13.06 Remove and replace alternator. P-3
- 13.07 Inspect, repair, or replace connectors and wires in the charging circuit. (P-2)
- 13.08 Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action. (P-1)

17.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0

- 17.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 17.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 17.03 Present information formally and informally for specific purposes and audiences. AF2.9

18.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.2.13 and SC.912.N.1.1

- 18.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0

- 18.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 18.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 18.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. --  
The students will be able to:
- 19.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 19.02 Explain emergency procedures to follow in response to workplace accidents.
  - 19.03 Create a disaster and/or emergency response plan. SHE 2.0



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 3  
**Course Number:** 8742030  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

14.0 Lighting Systems Diagnosis And Repair

This standard supports the following Sunshine State Standards: MA.912.D.6.1, SC.912.N.1.1 and SC.912.P.10.14

14.01 Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights --The student will be able to:

- 14.01.1 Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation. (P-1)
- 14.01.2 Test, aim, and replace headlights. (P-1)
- 14.01.3 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed. (P-1)
- 14.01.4 Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays and wires of parking, clearance, and taillight circuits; repair or replace as needed. (P-1)
- 14.01.5 Inspect and test instrument panel light circuit switches, relays, bulbs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed. (P-2)
- 14.01.6 Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-2)
- 14.01.7 Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed. (P-1)

14.02 Stoplights, turn signals, hazard lights, and back-up lights --The student will be able to:

- 14.02.1 Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-1)
- 14.02.2 Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-1)

- 14.02.3 Inspect, test, and adjust backup lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, and wires; repair or replace as needed. (P-2)

15.0 Gauges and warning devices diagnosis and repair --The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.10.1, MA.912.D.6.1, SC.912.N.1.1, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.12.2

- 15.01 Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action. (P-1)
- 15.02 Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action. (P-2)
- 15.03 Diagnose the cause of data bus-driven gauge malfunctions; determine needed action. (P-3)
- 15.04 Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed. (P-2)
- 15.05 Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed. (P-2)
- 15.06 Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems. (P-2)

16.0 Related electrical systems --The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.14 and SC.912.P.10.15

- 16.01 Diagnose the cause of constant, intermittent, or no horn operation; determine needed action. (P-2)
- 16.02 Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed. (P-2)
- 16.03 Diagnose the cause of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action. (P-2)
- 16.04 Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed. (P-2)
- 16.05 Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed. (P-2)
- 16.06 Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
- 16.07 Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
- 16.08 Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
- 16.09 Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed. (P-3)
- 16.10 Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action. (P-3)

- 16.11 Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed. (P-3)
- 16.12 Inspect block heaters; determine needed repairs. (P-2)
- 16.13 Inspect and test cruise control electrical components; repair or replace as needed. (P-3)
- 16.14 Inspect and test engine cooling fan electrical control components; repair or replace as needed. (P-2)
- 16.15 Diagnose cause of data buss communication problems; determine needed action.(P-3)

24.0 Use information technology tools. -- The students will be able to:

- 24.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 24.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 24.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 24.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

25.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 25.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 25.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 25.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 25.04 Interpret and explain written organizational policies and procedures. ELR 2.0

26.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

This standard supports the following Sunshine State Standards: MA.912.F.4.1

- 26.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 26.02 Describe the effect of money management on personal and career goals. FL 3.0
- 26.03 Develop a personal budget and financial goals. FL3.1
- 26.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 26.05 Maintain financial records. FL3.3
- 26.06 Read and reconcile financial statements. FL3.4
- 26.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 4  
**Course Number:** 8742040  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

20.0 Engine System

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.12.2, SC.912.P.10.15, SC.912.E.6.6, SC.912.L.17.15, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.12.3, SC.912.P.8.1, SC.912.P.10.4, SC.912.E.5.8,

Engine -- The student will be able to:

- 20.01.1 Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed (P-1)
- 20.01.2 Inspect vibration damper. (P-1)
- 20.01.3 Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment. (P-1)
- 20.01.4 Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off). (P-1)
- 20.01.5 Inspect engine mounts for looseness and deterioration. (P-1)
- 20.01.6 Check engine for oil, coolant, air, fuel and exhaust leaks (Engine Running). (P-1)
- 20.01.7 Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM). (P-1)

20.02 Fuel system -- The student will be able to:

- 20.02.1 Check fuel tanks, mountings, lines, caps, and vents. (P-1)
- 20.02.2 Inspect throttle linkages and return springs. (P-1)
- 20.02.3 Drain water from fuel system. (P-1)
- 20.02.4 Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system. (P-1)

20.03 Air induction and exhaust system--The student will be able to:

- 20.03.1 Check exhaust system mountings for looseness and damage. (P-1)

- 20.03.2 Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system if equipped. (P-1)
- 20.03.3 Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks. (P-1)
- 20.03.4 Inspect turbocharger for leaks; check mountings and connections. (P-1)
- 20.03.5 Check operation of engine compression/exhaust brake. (P-1)
- 20.03.6 Service or replace air filter as needed; check and reset air filter restriction indicator. (P-1)

20.04 Cooling system -- The student will be able to:

- 20.04.1 Check operation of fan clutch. (P-1)
- 20.04.2 Inspect radiator (including air flow restriction, leaks, and damage) and mountings. (P-1)
- 20.04.3 Inspect fan assembly and shroud. (P-1)
- 20.04.4 Pressure test cooling system and radiator cap. (P-1)
- 20.04.5 Inspect coolant hoses and clamps. (P-1)
- 20.04.6 Inspect coolant recovery system. (P-1)
- 20.04.7 Check coolant for contamination, supplemental coolant additives (SCA) concentration, and protection level (freeze point). (P-1)
- 20.04.8 Service coolant filter/conditioner. (P-1)
- 20.04.9 Inspect water pump for leaks and bearing play. (P-1)

20.05 Lubrication system -- The student will be able to:

- 20.05.1 Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs. (P-1)
- 20.05.2 Take an engine oil sample. (P-1)

21.0 Cab And Hood

This standard supports the following Sunshine State Standards: SC.912.P.8.1, SC.912.P.12.3, SC.912.P.12.5, SC.912.P.10.2, SC.912.P.10.3

21.01 Instruments and controls -- The student will be able to:

- 21.01.1 Inspect key condition and operation of ignition switch. (P-1)
- 21.01.2 Check warning indicators. (P-1)
- 21.01.3 Check instruments; record oil pressure and system voltage. (P-1)
- 21.01.4 Check mechanical, electronic, and emergency shut down operation. (P-1)
- 21.01.5 Check mechanical and electronic engine speed controls. (P-1)
- 21.01.6 Check heater, ventilation, and air conditioning (HVAC) controls. (P-1)
- 21.01.7 Check operation of all accessories. (P-1)
- 21.01.8 Using diagnostic tool or on-board diagnostic system; extract engine monitoring information. (P-1)

21.02 Safety equipment -- The student will be able to:

- 21.02.1 Check operation of electric/air horns and back-up warning devices (P-1)

- 21.02.2 Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals. (P-1)
- 21.02.3 Inspect seat belts and sleeper restraints. (P-1)
- 21.02.4 Inspect wiper blades and arms. (P-1)

21.03 Hardware -- The student will be able to:

- 21.03.1 Check wiper and washer operation. (P-1)
- 21.03.2 Inspect windshield glass for cracks or discoloration; check sun visor. (P-1)
- 21.03.3 Check seat condition, operation, and mounting. (P-1)
- 21.03.4 Check door glass and window operation. (P-1)
- 21.03.5 Inspect steps and grab handles. (P-1)
- 21.03.6 Inspect mirrors, mountings, brackets, and glass. (P-1)
- 21.03.7 Record all observed physical damage. (P-1)
- 21.03.8 Lubricate all cab and hood grease fittings. (P-1)
- 21.03.9 Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables. (P-1)
- 21.03.10 Inspect cab mountings, hinges, latches, linkages and ride height; service as needed. (P-1)
- 21.03.11 Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed. (P-1)

21.04 Heating, ventilation, & air conditioning (HVAC) -- The student will be able to:

- 21.04.1 Inspect A/C condenser and lines for condition and visible leaks; check mountings. (P-1)
- 21.04.2 Inspect A/C compressor and lines for condition and visible leaks; check mountings. (P-1)
- 21.04.3 Check A/C system condition and operation; check A/C monitoring system, if applicable. (P-1)
- 21.04.4 Check HVAC air inlet filters and ducts; service as needed. (P-1)

22.0 Electrical/Electronics

This standard supports the following Sunshine State Standards: SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.8.1, and SC.912.N.1.1

22.01 Battery and starting systems -- The student will be able to:

- 22.01.1 Inspect battery box(es), cover(s), and mountings. (P-1)
- 22.01.2 Inspect battery hold-downs, connections, cables, and cable routing; service as needed. (P-1)
- 22.01.3 Check/record battery state-of-charge (open circuit voltage) and condition. (P-1)
- 22.01.4 Perform battery test (load and/or capacitance). (P-1)
- 22.01.5 Inspect starter, mounting, and connections. (P-1)
- 22.01.6 Engage starter; check for unusual noises, starter drag, and starting difficulty. (P-1)

22.02 Charging system -- The student will be able to:

- 22.02.1 Inspect alternator, mountings, wiring and wiring routing; determine needed action. (P-1)
- 22.02.2 Perform alternator current output test. (P-1)
- 22.02.3 Perform alternator voltage output test. (P-1)

22.03 Lighting system -- The student will be able to:

- 22.03.1 Check operation of interior lights; determine needed action. (P-1)
- 22.03.2 Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action. (P-1)
- 22.03.3 Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action. (P-1)

## 23.0 Frame And Chassis

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.5, SC.912.P.12.3, SC.912.P.12.6, and SC.912.N.1.1

23.01 Air brakes -- The student will be able to:

- 23.01.1 Check parking brake operation. (P-1)
- 23.01.2 Record air governor cut-out setting (psi). (P-1)
- 23.01.3 Check air drier drain valve operation. (P-1)
- 23.01.4 Check air system for leaks (brakes released). (P-1)
- 23.01.5 Check air system for leaks (brakes applied). (P-1)
- 23.01.6 Test one-way and double-check valves. (P-1)
- 23.01.7 Check low air pressure warning devices. (P-1)
- 23.01.8 Check air governor cut-in pressure. (P-1)
- 23.01.9 Check emergency (spring) brake control/modulator valve, if applicable. (P-1)
- 23.01.10 Check tractor protection valve. (P-1)
- 23.01.11 Test air pressure build-up time. (P-1)
- 23.01.12 Inspect coupling air lines, holders, and gladhands. (P-1)
- 23.01.13 Check brake chambers and air lines for secure mounting and damage. (P-1)
- 23.01.14 Service air drier. (P-1)
- 23.01.15 Inspect and record brake lining/pad condition, thickness, and contamination. (P-1)
- 23.01.16 Inspect and record condition of brake drums/rotors. (P-1)
- 23.01.17 Check operation of brake manual slack adjusters; adjust as needed. (P-1)
- 23.01.18 Check operation and adjustment of brake automatic slack adjusters. (P-1)
- 23.01.19 Lubricate all brake component grease fittings. (P-1)
- 23.01.20 Check condition and operation of hand brake (trailer) control valve. (P-1)
- 23.01.21 Perform antilock brake system (ABS) operational system self-test. (P-1)
- 23.01.22 Drain air tanks and check for contamination. (P-1)
- 23.01.23 Check condition of pressure relief (safety) valves (P-1)

23.02 Hydraulic brakes -- The student will be able to:

- 23.02.1 Check master cylinder fluid level and condition. (P-1)
- 23.02.2 Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage. (P-1)

- 23.02.3 Check parking brake operation; inspect parking brake application and holding devices; adjust as needed. (P-1)
- 23.02.4 Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift). (P-1)
- 23.02.5 Inspect wheel cylinders/calipers for leakage and damage. (P-1)
- 23.02.6 Inspect power brake booster(s), hoses; and check/control valves; check power brake booster, reservoir fluid level and condition. P-1
- 23.02.7 Inspect and record brake lining/pad condition and thickness, and contamination. (P-1)
- 23.02.8 Inspect and record condition of brake drums/rotors. (P-1)
- 23.02.9 Adjust drum brakes. (P-1)

23.03 Drive train -- The student will be able to:

- 23.03.1 Check operation of clutch, clutch brake, and gearshift. (P-1)
- 23.03.2 Check clutch linkage/cable for looseness or binding, if applicable. (P-1)
- 23.03.3 Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable. (P-1)
- 23.03.4 Check clutch adjustment; adjust as needed. (P-1)
- 23.03.5 Check transmission case, seals, filter, hoses, and cooler for cracks and leaks. (P-1)
- 23.03.6 Inspect transmission breather. (P-1)
- 23.03.7 Inspect transmission mounts. (P-1)
- 23.03.8 Check transmission oil level, type, and condition. (P-1)
- 23.03.9 Inspect U-joints, yokes, drive lines, and center bearings for looseness, damage, and proper phasing. (P-1)
- 23.03.10 Inspect axle housing(s) for cracks and leaks. (P-1)
- 23.03.11 Inspect axle breather(s). (P-1)
- 23.03.12 Lubricate all drive train grease fittings. (P-1)
- 23.03.13 Check drive axle(s) oil level, type, and condition. (P-1)
- 23.03.14 Change drive axle(s) oil and filter; check and clean magnetic plugs.(P-1)
- 23.03.15 Check two-speed axle unit operation and oil level. (P-1)
- 23.03.16 Change transmission oil and filter; check and clean magnetic plugs.(P-1)
- 23.03.17 Check interaxle differential lock operation. (P-1)
- 23.03.18 Check range shift operation. (P-1)

23.04 Suspension and steering systems -- The student will be able to:

- 23.04.1 Check steering wheel operation for free play or binding. (P-1)
- 23.04.2 Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level. (P-1)
- 23.04.3 Change power steering fluid and filter. (P-1)
- 23.04.4 Inspect steering gear for leaks and secure mounting. (P-1)
- 23.04.5 Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, linkage, and linkage-assist power steering cylinders. (P-1)
- 23.04.6 Check king pin wear. (P-1)
- 23.04.7 Check wheel bearings for looseness and noise. (P-1)
- 23.04.8 Check oil level and condition in all non-drive hubs; check for leaks. (P-1)
- 23.04.9 Remove and inspect wheel bearings; reassemble and adjust. (P-1)
- 23.04.10 Inspect springs, hangers, shackles, spring U-bolts, and insulators. (P-1)



- 23.04.11 Inspect shock absorbers for leaks and secure mounting. (P-1)
- 23.04.12 Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage. (P-1)
- 23.04.13 Check and record suspension ride height. (P-1)
- 23.04.14 Lubricate all suspension and steering grease fittings. (P-1)
- 23.04.15 Check toe adjustment. (P-1)
- 23.04.16 Check tandem axle alignment and spacing. (P-1)
- 23.04.17 Check axle locating components (radius, torque, and/or track rods). (P-1)

23.05 Tires and wheels -- The student will be able to:

- 23.05.1 Inspect tires for irregular wear patterns and proper mounting of directional tires. (P-1)
- 23.05.2 Inspect tires for cuts, cracks, bulges, and sidewall damage. (P-1)
- 23.05.3 Inspect valve caps and stems; replace as needed. (P-1)
- 23.05.4 Measure and record tread depth; probe for imbedded debris. (P-1)
- 23.05.5 Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications. (P-1)
- 23.05.6 Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed. (P-1)
- 23.05.7 Retorque lugs in accordance with manufacturer's specifications. (P-1)
- 23.05.8 Inspect wheels and spacers for cracks or damage. (P-1)
- 23.05.9 Check tire matching (diameter and tread) on dual tire installations. (P-1)

23.06 Frame and fifth wheel -- The student will be able to:

- 23.06.1 Inspect fifth wheel mounting bolts, air lines, and locks. (P-1)
- 23.06.2 Test operation of fifth wheel locking device; adjust if necessary. (P-1)
- 23.06.3 Check mud flaps and brackets. (P-1)
- 23.06.4 Check pintle hook assembly and mounting. (P-1)
- 23.06.5 Lubricate all fifth wheel grease fittings and plate. (P-1)
- 23.06.6 Inspect frame and frame members for cracks and damage. (P-1)

35.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 35.01 Describe the nature and types of business organizations. SY 1.0
- 35.02 Explain the effect of key organizational systems on performance and quality.
- 35.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 35.04 Explain the impact of the global economy on business organizations.

36.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -  
- The students will be able to:

- 36.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 36.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 36.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 36.04 Employ mentoring skills to inspire and teach others. LT 5.0

37.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 37.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 37.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 37.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 37.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 37.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 37.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 37.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 37.08 Research the benefits of ongoing professional development. ECD 9.0
- 37.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 5  
**Course Number:** 8742050  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

27.0 General engine diagnosis -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.5.1, MA.912.A.5.4, SC.912.N.1.1, SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, SC.912.P.10.4, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.12, SC.912.P.8.1, and SC.912.P.8.2

- 27.01 Inspect fuel, oil, and coolant levels and condition, and consumption; determine needed action. (P-1)
- 27.02 Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action. (P-1)
- 27.03 Interpret engine noises; determine needed action. (P-2)
- 27.04 Observe engine exhaust smoke color and quantity; determine needed action. (P-1)
- 27.05 Perform air intake system restriction and leakage tests; determine needed action. (P-1)
- 27.06 Perform intake manifold pressure (boost) test; determine needed action. (P-1)
- 27.07 Perform exhaust back pressure test; determine needed action. (P-2)
- 27.08 Perform crankcase pressure test; determine needed action. (P-1)
- 27.09 Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action. (P-1)
- 27.10 Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action. (P-1)
- 27.11 Diagnose engine vibration problems; determine needed action. (P-2)
- 27.12 Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action. (P-1)
- 27.13 Perform cylinder compression test; determine needed action. (P-3)

28.0 Cylinder head and valve train diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.N.1.1, and SC.912.P.10.4

- 28.01 Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly. (P-1)
- 28.02 Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action. (P-1)

- 28.03 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-1)
- 28.04 Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action. (P-3)
- 28.05 Measure valve head height relative to deck, valve face-to-seat contact; determine needed action. (P-3)
- 28.06 Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action. (P-3)
- 28.07 Inspect and adjust valve bridges (crossheads) and guides; perform needed action. (P-2)
- 28.08 Reassemble cylinder head. (P-3)
- 28.09 Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash. (P-2)
- 28.10 Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; perform needed action. (P-2)
- 28.11 Inspect cam followers; perform needed action. (P-2)
- 28.12 Adjust valve clearance. (P-1)

29.0 Engine block diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.N.1.1, and SC.912.P.12.2

- 29.01 Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings. (P-1)
- 29.02 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-3)
- 29.03 Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action. (P-3)
- 29.04 Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action. (P-2)
- 29.05 Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion). (P-2)
- 29.06 Inspect in-block camshaft bearings for wear and damage; determine needed action. (P-3)
- 29.07 Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play. (P-3)
- 29.08 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)
- 29.09 Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play. (P-2)
- 29.10 Inspect, install, and time gear train; measure gear backlash; determine needed action. (P-3)
- 29.11 Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action. (P-2)
- 29.12 Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons. (P-2)

- 29.13 Assemble pistons and connecting rods; install in block; install rod bearings and check clearances. (P-2)
- 29.14 Check condition of piston cooling jets (nozzles); determine needed action. P-3
- 29.15 Inspect and measure crankshaft vibration damper; determine needed action. (P-3)
- 29.16 Inspect, install, and align flywheel housing. (P-3)
- 29.17 Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action. (P-3)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 6  
**Course Number:** 8742060  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

30.0 Lubrication systems diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.12.3,

- 30.01 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action. (P-1)
- 30.02 Check engine oil level, condition, and consumption; determine needed action. (P-1)
- 30.03 Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action. (P-3)
- 30.04 Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action. (P-3)
- 30.05 Inspect, clean, and test oil cooler and components; determine needed action. (P-3)
- 30.06 Inspect turbocharger lubrication system; determine needed action. (P-2)
- 30.07 Determine proper lubricant and perform oil and filter change. (P-1)

31.0 Cooling system diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.4, SC.912.P.12.2, SC.912.P.12.3, SC.912.E.6.6, and SC.912.P.17.15

- 31.01 Check engine coolant type, level, condition, and consumption; determine needed action. (P-1)
- 31.02 Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action. (P-2)
- 31.03 Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment. (P-1)
- 31.04 Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.(P-2)
- 31.05 Test coolant for freeze protection and additive package concentration; adjust as needed. (P-1)
- 31.06 Recover, flush, and refill with recommended coolant/additive package; bleed cooling system. (P-1)
- 31.07 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed. (P-1)
- 31.08 Inspect water pump and hoses; replace as needed. (P-1)

- 31.09 Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action. (P-1)
- 31.10 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed. (P-2)

32.0 Air induction and exhaust systems diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.10.3, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.12.3, and SC.912.N.1.1

- 32.01 Inspect turbocharger(s), wastegate, and piping systems; determine needed action. (P-2)
- 32.02 Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed. (P-1)
- 32.03 Remove and reinstall turbocharger/wastegate assembly. (P-2)
- 32.04 Inspect intake manifold, gaskets, and connections; replace as needed. (P-3)
- 32.05 Inspect, clean, and test charge air cooler assemblies; replace as needed. (P-2)
- 32.06 Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed. (P-2)
- 32.07 Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action. (P-2)

33.0 Fuel System Diagnosis And Repair

This standard supports the following Sunshine State Standards: MA.912.A.1.1, MA.912.S.3.4, MA.912.S.3.5, MA.912.S.4.1, SC.912.N.1.1, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.10.4, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.12.12, SC.912.P.10.3, and SC.912.N.3.5

33.01 Fuel supply system diagnosis and repair -- The student will be able to:

- 33.01.1 Check fuel level, quality, and consumption; determine needed action. (P-1)
- 33.01.2 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action. (P-1)
- 33.01.3 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)
- 33.01.4 Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action. (P-1)
- 33.01.5 Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump. (P-1)

33.02 Mechanical fuel injection diagnosis and repair -- The student will be able to:

- 33.02.1 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time a distributor (rotary) type injection pump; determine needed action. (P-3)
- 33.02.2 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time an in-line type injection pump; determine needed action. (P-3)
- 33.02.3 Inspect and adjust throttle control linkage; determine needed action. (P-3)

- 33.02.4 Inspect air/fuel ratio control systems; determine needed action. (P-3)
- 33.02.5 Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action. (P-3)
- 33.02.6 Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed. (P-3)

33.03 Electronic fuel management system diagnosis and repair -- The student will be able to:

- 33.03.1 Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action. (P-1)
- 33.03.2 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action. (P-1)
- 33.03.3 Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams). (P-1)
- 33.03.4 Inspect and replace electrical connector terminals, seals, and locks. (P-2)
- 33.03.5 Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed. (P-1)
- 33.03.6 Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters. (P-1)
- 33.03.7 Inspect, test, and adjust electronic unit injectors (EUI); determine needed action. (P-2)
- 33.03.8 Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable). (P-2)
- 33.03.9 Perform cylinder contribution test utilizing recommended electronic diagnostic tool. (P-1)
- 33.03.10 Perform engine timing sensor calibration (if applicable). (P-3)
- 33.03.11 Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action. (P-2)
- 33.03.12 Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI)-high pressure oil supply and control system; determine needed action. (P-2)
- 33.03.13 Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action. (P-2)
- 33.03.14 Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action. (P-2)
- 33.03.15 Perform on-engine inspections and tests on common rail type injection systems; determine needed action. (P-3)

34.0 Engine brakes -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.8.1, SC.912.P.8.2, SC.912.P.10.4, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, and SC.912.P.12.12

- 34.01 Inspect and adjust engine compression/exhaust brakes; determine needed action. (P-2)
- 34.02 Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed. (P-3)



34.03 Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed. (P-3)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 7  
**Course Number:** 8742070  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

**Air Brakes Diagnosis and Repair**

38.0 Air supply and service systems -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.P.10.3, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.12.3, and SC.912.N.1.1

- 38.01 Diagnose poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determine needed action. (P-1)
- 38.02 Check air system build-up time; determine needed action. (P-1)
- 38.03 Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action. (P-1)
- 38.04 Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed. (P-1)
- 38.05 Inspect compressor drive gear and coupling; replace as needed. (P-3)
- 38.06 Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.P-2
- 38.07 Inspect and test system pressure controls: governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings; replace as needed.P-2
- 38.08 Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed. (P-1)
- 38.09 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)
- 38.10 Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed. (P-1)
- 38.11 Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed. (P-1)
- 38.12 Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed. (P-1)
- 38.13 Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed. (P-1)

- 38.14 Inspect and test brake relay valve; replace as needed. (P-1)
- 38.15 Inspect and test quick release valves; replace as needed. (P-1)
- 38.16 Inspect and test front and rear axle limiting (proportioning) valves; replace as needed. (P-3)
- 38.17 Inspect and test tractor protection valve; replace as needed. (P-1)
- 38.18 Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed. (P-1)
- 38.19 Inspect and test low pressure warning devices, wiring, and connectors; replace as needed. (P-1)
- 38.20 Inspect and test air pressure gauges, lines, and fittings; replace as needed. (P-2)

39.0 Mechanical/foundation -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.1.1, SC.912.P.10.3, SC.912.P.10.14, SC.912.P.10.15, and SC.912.P.12.3

- 39.01 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)
- 39.02 Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed. (P-1)
- 39.03 Inspect and service manual and automatic slack adjusters; perform needed action. (P-1)
- 39.04 Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs; replace as needed (P-1)
- 39.05 Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs. (P-3)
- 39.06 Inspect and measure brake shoes, linings, or pads; perform needed action. P-1
- 39.07 Inspect and measure brake drums or rotors; perform needed action. (P-1)

40.0 Parking brakes -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.1, SC.912.P.10.2, and SC.912.P.10.6

- 40.01 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)
- 40.02 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed. (P-1)
- 40.03 Inspect and test parking (spring) brake application and release valve; replace as needed. (P-2)
- 40.04 Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations. (P-1)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 8  
**Course Number:** 8742080  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

**Hydraulic Brakes Diagnosis and Repair**

41.0 Hydraulic system -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.12.3, SC.912.P.10.14, and SC.912.P.10.15

- 41.01 Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action. (P-1)
- 41.02 Check and adjust brake pedal pushrod length. (P-3)
- 41.03 Inspect and test master cylinder for internal/external leaks and damage; replace as needed. (P-1)
- 41.04 Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed. (P-1)
- 41.05 Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed. (P-2)
- 41.06 Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed. (P-2)
- 41.07 Inspect and clean wheel cylinders; replace as needed. (P-1)
- 41.08 Inspect and clean disc brake caliper assemblies; replace as needed. (P-1)
- 41.09 Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type. (P-1)
- 41.10 Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed. (P-1)

42.0 Mechanical/foundation -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, MA.912.S.3.4, MA.912.S.3.5, SC.912.N.1.1, SC.912.P.10.4, and SC.912.P.12.3

- 42.01 Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action. (P-1)
- 42.02 Inspect and measure brake drums and rotors; perform needed action. (P-1)

- 42.03 Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action. (P-1)
- 42.04 Inspect and measure disc brake pads/linings; inspect mounting hardware; perform needed action. (P-1)
- 42.05 Check parking brake operation; inspect parking brake applications and holding devices; adjust and replace as needed. (P-1)

43.0 Power assist units -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.1, SC.912.P.10.2, and SC.912.P.12.3

- 43.01 Diagnose poor stopping problems caused by the brake assist (booster) system; determine needed action. (P-2)
- 43.02 Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type. (P-2)
- 43.03 Check emergency (back-up, reserve) brake assist system. (P-2)

44.0 Air and hydraulic antilock brake systems (abs) and automatic traction control (ATC) -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.12.2, and SC.912.P.12.3

- 44.01 Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action. (P-1)
- 44.02 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action. (P-1)
- 44.03 Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action. (P-1)
- 44.04 Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action. (P-1)
- 44.05 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).(P-1)
- 44.06 Bleed the ABS hydraulic circuits following manufacturers' procedures. (P-2)
- 44.07 Observe automatic traction control (ATC) warning light operation; determine needed action. (P-3)
- 44.08 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)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 9  
**Course Number:** 8742090  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

45.0 HVAC systems diagnosis, service, and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.8.1, and SC.912.P.10.4

- 45.01 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action. (P-1)
- 45.02 Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action. (P-1)
- 45.03 Identify system type and components (cycling clutch orifice tube - CCOT, expansion valve) and conduct performance test(s) on HVAC systems; determine needed action. (P-1)

46.0 A/C System And Component Diagnosis, Service, And Repair

This standard supports the following Sunshine State Standards: MA.912.G.1.1, MA.912.A.3.3, SC.912.P.8.1, SC.912.P.10.4, SC.912.N.1.1, SC.912.P.10.3, SC.912.P.10.4, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.12.3, SC.912.E.6.6, and SC.912.L.17.15

46.01 A/C system – general -- The student will be able to:

- 46.01.1 Diagnose the cause of temperature control problems in the A/C system; determine needed action. (P-1)
- 46.01.2 Identify refrigerant type and check for contamination; determine needed action. (P-2)
- 46.01.3 Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action. (P-1)
- 46.01.4 Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action. (P-1)4
- 46.01.5 Perform A/C system leak test; determine needed action. (P-1)
- 46.01.6 Evacuate A/C system using appropriate equipment. (P-1)
- 46.01.7 Internally clean contaminated A/C system components and hoses. (P-2)
- 46.01.8 Charge A/C system with refrigerant. (P-1)
- 46.01.9 Identify lubricant type needed for system application. (P-1)

46.02 Compressor and clutch -- The student will be able to:

- 46.02.1 Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action. (P-1)
- 46.02.2 Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices. (P-2)
- 46.02.3 Inspect, and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment. (P-1)
- 46.02.4 Inspect, test, service, and replace A/C compressor clutch components or assembly. (P-3)
- 46.02.5 Inspect and correct A/C compressor lubricant level (if applicable). (P-2)
- 46.02.6 Inspect, test, and replace A/C compressor. (P-2)
- 46.02.7 Inspect, repair, or replace A/C compressor mountings and hardware. (P-2)

46.03 Evaporator, condenser, and related components -- The student will be able to:

- 46.03.1 Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses. (P-1)
- 46.03.2 Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action. (P-1)
- 46.03.3 Inspect A/C condenser for proper air flow. (P-1)
- 46.03.4 Inspect and test A/C system condenser and mountings; determine needed action. (P-2)
- 46.03.5 Inspect and replace receiver/drier or accumulator/drier. (P-1)
- 46.03.6 Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action. (P-3)
- 46.03.7 Inspect and replace orifice tube. (P-1)
- 46.03.8 Inspect and test cab/sleeper evaporator core; determine needed action. P-3
- 46.03.9 Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter. (P-1)
- 46.03.10 Identify and inspect A/C system service ports (gauge connections); determine needed action. P1
- 46.03.11 Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action. (P-2)

46.04 Heating and engine cooling systems diagnosis, service, and repair -- The student will be able to:

- 46.04.1 Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action. (P-1)
- 46.04.2 Diagnose window fogging problems; determine needed action. (P-2)
- 46.04.3 Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action. (P-1)
- 46.04.4 Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action. (P-1)
- 46.04.5 Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action. (P-1)

- 46.04.6 Inspect water pump for leaks and bearing play; determine needed action. (P-2)
- 46.04.7 Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs. (P-2)
- 46.04.8 Recover, flush and refill with recommended coolant/additive package; bleed cooling system. (P-1)
- 46.04.9 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed. (P-2)
- 46.04.10 Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action. (P-2)
- 46.04.11 Inspect and flush heater core; determine needed action. (P-2)

#### 47.0 Operating Systems And Related Controls Diagnosis And Repair

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.3, SC.912.P.10.14, SC.912.P.10.15, SC.912.P.10.16, SC.912.P.12.3, SC.912.E.6.6, SC.912.L.17.15, SC.912.E.5.4, SC.912.P.8.1, and SC.912.P.8.2

##### 47.01 Electrical -- The student will be able to:

- 47.01.1 Diagnose the cause of failures in HVAC electrical control systems; determine needed action. (P-1)
- 47.01.2 Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action. (P-2)
- 47.01.3 Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action. (P-2)
- 47.01.4 Inspect and test A/C-related electronic engine control systems; determine needed action. (P-2)
- 47.01.5 Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors wiring, and protection devices; determine needed action. (P-2)
- 47.01.6 Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action. (P-3)
- 47.01.7 Inspect and test HVAC system electrical control panel assemblies; determine needed action. (P-3)

##### 47.02 Air/vacuum/mechanical -- The student will be able to:

- 47.02.1 Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action. (P-1)
- 47.02.2 Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action. (P-3)
- 47.02.3 Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action. (P-3)
- 47.02.4 Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action. (P-3)
- 47.02.5 Inspect and test HVAC system vacuum reservoir(s), check valve(s), and restrictors; determine needed action. (P-3)
- 47.02.6 Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action. (P-3)



47.03 Refrigerant recovery, recycling, and handling -- The student will be able to:

**NOTE: Tasks 1 through 5 should be accomplished in accordance with published EPA and appropriate SAE "J" standards for R-12, R-134a, and EPA approved refrigerant blends.**

- 47.03.1 Maintain and verify correct operation of certified equipment. (P-1)
- 47.03.2 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. (P-1)
- 47.03.3 Recycle refrigerant. (P-1)
- 47.03.4 Handle, label, and store refrigerant. (P-1)
- 47.03.5 Test recycled refrigerant for non-condensable gases. (P-1)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 10  
**Course Number:** 8742091  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

48.0 Steering Systems Diagnosis And Repair

This standard supports the following Sunshine State Standards: MA.912.A.3.3, MA.912.G.1.1, SC.912.N.1.1, SC.912.P.10.3, SC.912.P.12.2, and SC.912.P.12.3

48.01 Steering column -- The student will be able to:

- 48.01.1 Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action. (P-1)
- 48.01.2 Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action. (P-1)
- 48.01.3 Check and adjust cab mounting and ride height. (P-3)
- 48.01.4 Center the steering wheel as needed. (P-1)
- 48.01.5 Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures. (P-1)

48.02 Steering units -- The student will be able to:

- 48.02.1 Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed action. (P-1)
- 48.02.2 Determine recommended type of power steering fluid; check level and condition; determine needed action. (P-1)
- 48.02.3 Flush and refill power steering system; purge air from system. (P-2)
- 48.02.4 Perform power steering system pressure, temperature, and flow tests; determine needed action. (P-2)
- 48.02.5 Inspect, service, or replace power steering reservoir including filter, seals, and gaskets. (P-2)
- 48.02.6 Inspect, and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment. (P-1)
- 48.02.7 Inspect, replace as required, power steering pump drive gear and coupling. (P-3)

- 48.02.8 Inspect, adjust, or replace power steering pump, mountings, and brackets. (P-3)
- 48.02.9 Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings. (P-3)
- 48.02.10 Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system). (P-3)
- 48.02.11 Inspect, adjust, repair, or replace integral type power steering gear and mountings. (P-1)
- 48.02.12 Adjust manual and automatic steering gear poppet/relief valves. (P-2)

48.03 Steering linkage -- The student will be able to:

- 48.03.1 Inspect and align pitman arm; replace as needed. (P-1)
- 48.03.2 Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed. (P-1)
- 48.03.3 Inspect steering arm and levers, and linkage pivot joints; replace as needed. (P-1)
- 48.03.4 Inspect clamps and retainers on cross tube/relay rod/centerline/tie rod; position or replace as needed. (P-1)
- 48.03.5 Check and adjust wheel stops. (P-1)
- 48.03.6 Lubricate steering linkage joints as needed. (P-1)

49.0 Suspension systems diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.N.1.1, SC.912.P.10.1, SC.912.P.12.2, and SC.912.P.12.3

- 49.01 Inspect front axles, U-bolts, and nuts; determine needed action. (P-1)
- 49.02 Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action. (P-1)
- 49.03 Inspect shock absorbers, bushings, brackets, and mounts; replace as needed. (P-1)
- 49.04 Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action. (P-1)
- 49.05 Inspect torque arms, bushings, and mounts; determine needed action. (P-1)
- 49.06 Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action. P-1
- 49.07 Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed. (P-3)
- 49.08 Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed. (P-1)
- 49.09 Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed. (P-1)
- 49.10 Measure vehicle ride height; determine needed action. (P-1)
- 49.11 Diagnose rough ride problems; determine needed action. (P-3)

50.0 Wheel alignment diagnosis, adjustment, and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.3, MA.912.G.6.2, MA.912.G.6.5, MA.912.G.1.1, SC.912.N.1.1, SC.912.P.12.2, and SC.912.P.12.3

- 50.01 Diagnose vehicle wandering, pulling, shimmy, hard steering and off-center steering wheel problem(s); adjust and repair as needed. (P-1)
- 50.02 Check camber; determine needed action. (P-2)
- 50.03 Check caster; adjust as needed. (P-2)
- 50.04 Check toe; adjust as needed. (P-1)
- 50.05 Check rear axle(s) alignment (thrust line/centerline) and tracking; adjust or repair as needed. (P-2)
- 50.06 Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action. (P-3)
- 50.07 Check front axle alignment (centerline); adjust or repair as needed. (P-2)

51.0 Wheels and tires diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.N.1.1, SC.912.P.12.2, and SC.912.P.12.3

- 51.01 Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action. (P-1)
- 51.02 Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action. (P-2)

52.0 Frame service and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1

- 52.01 Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action. (P-1)
- 52.02 Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls. (P-1)
- 52.03 Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs. (P-1)
- 52.04 Inspect, install, or repair frame hangers, brackets, and crossmembers in accordance with manufacturers' recommended procedures. (P-3)
- 52.05 Inspect, repair or replace pintle hooks and draw bars. (P-1)

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 11  
**Course Number:** 8742092  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

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

53.0 Clutch diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.G.1.1, SC.912.N.1.1, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.10.1, SC.912.P.10.3, SC.912.P.10.3, and SC.912.P.12.1

- 53.01 Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action. (P-1)
- 53.02 Inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull-type assemblies); check pedal height and travel; perform needed action. (P-1)
- 53.03 Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system. (P-2)
- 53.04 Inspect, adjust, lubricate or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals. (P-1)
- 53.05 Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc. (P-2)
- 53.06 Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs. (P-1)
- 53.07 Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action. (P-1)
- 53.08 Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms. (P-2)
- 53.09 Inspect and replace pilot bearing. (P-1)
- 53.10 Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action. (P-1)
- 53.11 Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action. (P-1)
- 53.12 Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action. (P-1)

54.0 Transmission diagnosis and repair -- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1 MA.912.S.3.4, MA.912.A.10.1, MA.912.G.8.2, SC.912.N.1.1, SC.912.P.12.2, SC.912.P.12.3, SC.912.P.12.6, SC.912.P.10.1, SC.912.P.10.3, SC.912.P.10.4, SC.912.P.10.14, and SC.912.P.10.15

- 54.01 Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action. (P-1)
- 54.02 Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action. (P-2)
- 54.03 Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers. (P-2)
- 54.04 Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies. (P-1)
- 54.05 Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action. (P-3)
- 54.06 Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed. (P-1)
- 54.07 Check transmission fluid level and condition; determine needed service; add proper type of lubricant. (P-1)
- 54.08 Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires. (P-2)
- 54.09 Remove and reinstall transmission. (P-1)
- 54.10 Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed. (P-3)
- 54.11 Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed. (P-3)
- 54.12 Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed. (P-3)
- 54.13 Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed. (P-3)
- 54.14 Inspect and/or replace reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable). (P-3)
- 54.15 Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed. (P-3)
- 54.16 Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed. (P-3)
- 54.17 Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed. (P-3)
- 54.18 Inspect transmission oil filters and coolers; replace as needed. (P-2)
- 54.19 Inspect mechanical and electronic speedometer components; determine needed action. (P-2)
- 54.20 Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; perform needed action. (P-3)
- 54.21 Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed. (P-1)
- 54.22 Inspect and test transmission temperature gauge sending unit/sensor; determine needed action. (P-2)
- 54.23 Inspect, test operation, adjust, repair, or replace automated mechanical transmission and manual electronic shift controls, shift, range and splitter solenoids, shift motors,

- indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses. (P-2)
- 54.24 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines. (P-2)
- 54.25 Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs. (P-2)
- 54.26 Inspect, test operation, adjust, repair, or replace automatic transmission electronic and manual shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCE) neutral/in gear and reverse switches and wiring harnesses. (P-3)
- 54.27 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, switches, displays and indicators, wiring harnesses. (P-2)
- 54.28 Use appropriate diagnostic tools and procedures to diagnose automated transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs. (P-2)
- 55.0 Driveshaft and universal joint diagnosis and repair -- The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.A.3.9, SC.912.N.1.1, SC.912.P.12.2, and SC.912.P.12.3
- 55.01 Diagnose driveshaft and universal joint noise and vibration problems; determine needed action. (P-1)
- 55.02 Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes. (P-1)
- 55.03 Inspect and replace driveshaft center support bearings and mounts; determine needed action. (P-1)
- 55.04 Measure and adjust drive line angles. (P-1)
- 56.0 Drive axle diagnosis and repair -- The student will be able to:
- This standard supports the following Sunshine State Standards: MA.912.G.5.4, SC.912.N.1.1, SC.912.P.10.4, SC.912.P.10.3, SC.912.P.12.2, and SC.912.P.12.3
- 56.01 Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action. (P-2)
- 56.02 Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals. (P-1)
- 56.03 Check drive axle fluid level and condition; determine needed service; add proper type of lubricant. (P-1)
- 56.04 Remove and replace differential carrier assembly. (P-2)
- 56.05 Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings. (P-3)
- 56.06 Inspect and replace components of locking differential case assembly. (P-3)
- 56.07 Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action. (P-3)
- 56.08 Measure ring gear runout; determine needed action. (P-3)
- 56.09 Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings. (P-3)

- 56.10 Measure and adjust drive pinion bearing preload. (P-3)
- 56.11 Measure and adjust drive pinion depth. (P-3)
- 56.12 Measure and adjust side bearing preload and ring gear backlash. (P-3)
- 56.13 Check and interpret ring gear and pinion tooth contact pattern; determine needed action. (P-3)
- 56.14 Inspect, adjust, or replace ring gear thrust block/bolt. (P-3)
- 56.15 Inspect, adjust, repair, or replace planetary gear-type 2-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover, and springs. (P-3)
- 56.16 Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors. (P-3)
- 56.17 Inspect power divider (inter-axle differential) assembly; determine needed action. (P-3)
- 56.18 Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls. (P-2)
- 56.19 Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters. (P-3)
- 56.20 Inspect and replace drive axle shafts. (P-1)
- 56.21 Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action. (P-1)
- 56.22 Diagnose drive axle for wheel bearing noise and damage; perform needed action. (P-1)
- 56.23 Inspect and test drive axle temperature gauge sending unit/sensor; determine needed action. (P-2)
- 56.24 Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings. (P-1)



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Diesel Engine Service 12  
**Course Number:** 8742093  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the diesel technology industry. These competencies include demonstrating shop organization, management, and safety procedures; using tools and equipment; demonstrating workplace communication skills; applying math and science to diesel technology operations; and identifying basic employability and entrepreneurial skills.

57.0 General System Operation-- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.10.1, MA.912.G.8.2, SC.912.N.1.1, SC.912.P.10.2, SC.912.P.10.4, SC.912.P.12.3, and SC.912.P.12.12

- 57.01 Identify system type (closed and open) and verify proper operation. (P-1)
- 57.02 Read and interpret system diagrams and schematics. (P-1)
- 57.03 Perform system temperature, pressure, flow, and cycle time tests; determine needed action. (P-1)
- 57.04 Verify placement of equipment /component safety labels and placards; determine needed action. (P-1)

58.0 Pumps -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.P.10.1, SC.912.P.10.3, SC.912.N.1.1, SC.912.P.10.1, and SC.912.P.10.3

- 58.01 Identify system fluid type. (P-1)
- 58.02 Identify causes of pump failure, unusual pump noises, and temperature, flow, and leakage problems; determine needed action. (P-2)
- 58.03 Determine pump type, rotation, and drive system. (P-2)
- 58.04 Remove and install pump; prime and/or bleed system. (P-2)
- 58.05 Inspect pump inlet for restrictions and leaks; determine needed action. (P-2)
- 58.06 Inspect pump outlet for restrictions and leaks; determine needed action. (P-2)

59.0 Filtration/ Reservoirs (Tanks) -- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1, SC.912.E.6.6, and SC.912.L.17.15

- 59.01 Identify type of filtration system; verify filter application and flow direction. (P-1)
- 59.02 Service filters and breathers. (P-1)
- 59.03 Identify causes of system contamination; determine needed action. (P-2)
- 59.04 Take a hydraulic oil sample. (P-2)

- 59.05 Check reservoir fluid level and condition; determine needed action. (P-1)
- 59.06 Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines. (P-2)

60.0 Hoses, Fittings, and Connections-- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.N.1.1

- 60.01 Diagnose causes of component leakage, damage, and restriction; determine needed action. (P-2)
- 60.02 Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed. (P-1)
- 60.03 Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination. (P-2)
- 60.04 Inspect and replace fitting seals and sealants. (P-2)

61.0 Control Valves-- The student will be able to:

This standard supports the following Sunshine State Standards: MA.912.A.1.1, SC.912.P.10.16, SC.912.P.10.14, and SC.912.P.10.15

- 61.01 Pressure test system safety relief valve; determine needed action. (P-2)
- 61.02 Perform control valve operating pressure and flow tests; determine needed action. (P-2)
- 61.03 Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic). (P-2)
- 61.04 Identify causes of control valve leakage problems (internal/external); determine needed action. (P-2)
- 61.05 Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed. (P-1)

62.0 Actuators-- The student will be able to:

This standard supports the following Sunshine State Standards: SC.912.P.10.1, SC.912.P.10.2, SC.912.P.10.3, and SC.912.N.1.1

**Comply with manufacturers' and industry accepted safety practices associated with equipment lock out/tag out; pressure line release; implement/support (blocked or resting on ground); and articulated cylinder devices/machinery safety locks.**

- 62.01 Identify actuator type (single/double acting, multi-stage/telescopic, and motors) (P-1)
- 62.02 Identify the cause of seal failure; determine needed repairs. (P-2)
- 62.03 Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs. (P-2)
- 62.04 Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action. (P-2)
- 62.05 Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures. (P-2)
- 62.06 Inspect actuators for dents, cracks, damage, and leakage; determine needed action. (P-2)
- 62.07 Purge and/or bleed system in accordance with manufacturers' recommended procedures. (P-1)

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Service Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	8751000	I490306
CIP Number	0649.030600	0649.030600
Grade Level	9-12, 30, 31	30,31
Standard Length	9 credits	1350 hours
Teacher Certification	DIESEL MECH @7 G GASENG RPR @7 G	DIESEL MECH @7 G GASENG RPR @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3051	49-3051
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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 the following: service, repair and overhaul of four-stroke and two-stroke cycle engines and outboard motors; and service and repair of boating accessories. With regard to the above, course content will include electrical systems, fuel systems, power transfer systems, ignition systems, cooling systems, lubrication systems, drive systems and boat and trailer rigging.

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

### Program Structure

This program is a planned sequence of instruction consisting of six OCP's.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0003	Marine Rigger	300	49-3051
B	MTE0050	Outboard Engine Technician 1	300	49-3051
C	MTE0070	Outboard Engine Technician 2	300	49-3051
D	MTE0183	Stern Drive Technician	150	49-3051
E	MTE0054	Inboard Gas Technician	150	49-3051
F	MTE0056	Inboard Diesel Technician	150	49-3051

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8751010	Marine Service 1	1 credit	49-3051	2
	8751020	Marine Service 2	1 credit	49-3051	2
B	8751030	Marine Service 3	1 credit	49-3051	2
C	8751040	Marine Service 4	1 credit	49-3051	2
	8751050	Marine Service 5	1 credit	49-3051	2
	8751060	Marine Service 6	1 credit	49-3051	2
	8751070	Marine Service 7	1 credit	49-3051	2
D	8751080	Marine Service 8		49-3051	2
E	8751080	Marine Service 8	1 credit	49-3051	2
	8721090	Marine Service 9			
F	8721090	Marine Service 9	1 credit	49-3051	2

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

## **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

## **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

## **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Perform shop practices to industry standards.
- 02.0 Maintain and repair basic four-stroke cycle engines.
- 03.0 Maintain and repair basic two-stroke cycle engines.
- 04.0 Maintain and repair electrical systems.
- 05.0 Maintain and repair fuel systems.
- 06.0 Maintain and repair two-stroke cycle carburetors.
- 07.0 Use marine woods, metals and fiberglass.
- 08.0 Adjust and repair trailers.
- 09.0 Prepare and deliver sales merchandise.
- 10.0 Parts specialist and computer skills to industry standards.
- 11.0 Maintain and repair cooling systems.
- 12.0 Maintain and repair lubrication systems.
- 13.0 Demonstrate mathematics knowledge and skills.
- 14.0 Demonstrate science knowledge and skills
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 16.0 Perform gasket/seal operations and electronic test skills to industry standards.
- 17.0 Maintain and repair basic two stroke cycle outboard engines.
- 18.0 Maintain and repair outboard fuel systems.
- 19.0 Maintain and repair outboard cooling systems.
- 20.0 Maintain and repair outboard lubrication systems.
- 21.0 Maintain and repair outboard lower gear cases.
- 22.0 Demonstrate language arts knowledge and skills
- 23.0 Solve problems using critical thinking skills, creativity and innovation.
- 24.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 25.0 Maintain and repair outboard cranking systems.
- 26.0 Maintain and repair outboard magneto systems.
- 27.0 Maintain and repair outboard battery ignition systems.
- 28.0 Maintain and repair outboard capacitor discharge ignition systems.
- 29.0 Maintain and repair outboard charging systems.
- 30.0 Perform outboard upper to lower gear case maintenance.
- 31.0 Assemble and maintain outboard lower units and housing assemblies.
- 32.0 Use information technology tools
- 33.0 Describe the importance of professional ethics and legal responsibilities.
- 34.0 Demonstrate personal money-management concepts, procedures, and strategies
- 35.0 Maintain and repair basic four-stroke cycle stern drive engines.
- 36.0 Maintain and repair stern drive fuel systems.
- 37.0 Maintain and repair stern drive cooling systems.
- 38.0 Maintain and repair stern drive lubrication systems.
- 39.0 Maintain and repair stern drive upper gear case.
- 40.0 Maintain and repair stern drive lower gear case.

- 41.0 Maintain and repair stern drive battery ignition.
- 42.0 Maintain and repair stern drive; capacitor discharge ignition system.
- 43.0 Maintain and repair stern drive intermediate housing.
- 44.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 45.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 46.0 Explain the importance of employability and entrepreneurship skills
- 47.0 Perform parts manual activities to industry standards.
- 48.0 Maintain and repair basic four-stroke cycle inboard gas engine.
- 49.0 Maintain and repair inboard fuel systems.
- 50.0 Maintain and repair inboard gas cooling systems.
- 51.0 Maintain and repair inboard gas lubrication systems.
- 52.0 Maintain and repair inboard gas fuel systems.
- 53.0 Maintain and repair inboard gas transmissions.
- 54.0 Maintain and repair inboard diesel fuel systems.
- 55.0 Maintain and repair inboard diesel cooling systems.
- 56.0 Maintain and repair inboard diesel lubrication systems.
- 57.0 Maintain and repair inboard diesel charging systems.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Marine Service Technology**  
**PSAV Number: I490306**

**Course Number: MTE0003**  
**Occupational Completion Point: A**  
**Marine Rigger – 300 Hours – SOC Code 49-3051**

- 01.0 Perform shop practices to industry standards--The student will be able to:
- 01.01 Comply with safety rules and regulations.
  - 01.02 Use hand tools safely and properly.
  - 01.03 Set up and use power tools safely and properly.
  - 01.04 Set up and use precision measuring tools.
  - 01.05 Drill and remove broken studs and install helicoils.
  - 01.06 Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility.
  - 01.07 Read, interpret and apply service manuals.
  - 01.08 Locate and match electrical units by their symbols on a wiring diagram.
  - 01.09 Demonstrate appropriate heating, cutting, and welding skills.
- 02.0 Maintain and repair basic four-stroke cycle engines--The student will be able to:
- 02.01 Explain the basic principles of the operation of four-stroke cycle internal combustion engines.
  - 02.02 Identify types of four-stroke cycle engines.
  - 02.03 Locate engine serial and model numbers.
  - 02.04 Identify engine assemblies and systems.
- 03.0 Maintain and repair basic two-stroke cycle engines--The student will be able to:
- 03.01 Explain the basic principles of the operation of two-stroke cycle internal combustion engines.
  - 03.02 Identify types of engines.
  - 03.03 Locate engine serial and model numbers.
  - 03.04 Identify engine assemblies and systems.
- 04.0 Maintain and repair electrical systems--The student will be able to:
- 04.01 Set up and use voltmeters, ammeters and ohmmeters.
  - 04.02 Locate and identify electrical circuit components.
  - 04.03 Sketch a typical circuit using a single wire system.
  - 04.04 Test storage batteries using a hydrometer.
  - 04.05 Test storage batteries using a light and load test.
  - 04.06 Charge storage batteries.
  - 04.07 Remove and replace batteries and service battery boxes.
  - 04.08 Repair damaged wire and electrical harnesses.

- 04.09 Diagnose circuit troubles using continuity or a test light and low reading voltmeters to record voltage drop.
  - 04.10 Sketch and label typical fuel gage systems.
  - 04.11 Remove and replace ammeters or indicating lights.
  - 04.12 Remove and replace fuel gages.
  - 04.13 Remove and replace fuel-sending units.
  - 04.14 Diagnose gages and accessory system troubles using test lights, voltmeters, ammeters or detached sending units.
  - 04.15 Sketch typical circuits such as those for auto bilge pumps or navigation lights.
  - 04.16 Locate opens, shorts and grounds.
  - 04.17 Demonstrate proficiency in soldering/splicing skills.
- 05.0 Maintain and repair fuel systems--The student will be able to:
- 05.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
  - 05.02 Sketch and label the parts of total fuel systems.
  - 05.03 Service fuel lines and primer bulbs (vacuum test).
  - 05.04 Remove, clean, inspect and install fuel tanks.
  - 05.05 Identify basic carburetor circuits (chokes, floats, fuel inlets; idle, intermediate and high speeds; mains, etc.)
  - 05.06 Identify and locate fuel pumps.
  - 05.07 Determine and make appropriate fuel oil mixtures.
- 06.0 Maintain and repair two-stroke cycle carburetors--The student will be able to:
- 06.01 Remove, clean, overhaul, replace and make final adjustments to carburetors.
  - 06.02 Diagnose exhaust problems such as back pressure and scavenging.
- 07.0 Use marine woods, metals, and fiberglass--The student will be able to:
- 07.01 Explain the hazards of a marine environment to woods, metals and fiberglass.
  - 07.02 Explain a galvanic series.
  - 07.03 Explain the theory for using given materials in boat repair activities.
- 08.0 Adjust and repair trailers--The student will be able to:
- 08.01 Make boat to trailer adjustments.
  - 08.02 Remove and replace lighting systems.
  - 08.03 Remove and replace wheel bearings and springs.
  - 08.04 Remove and replace brakes.
  - 08.05 Service and install trim and tilt systems.
  - 08.06 Remove and test cylinder rams.
  - 08.07 Adjust reverse locks.
  - 08.08 Adjust the trim and tilt.
- 09.0 Prepare and deliver sales merchandise--The student will be able to:
- 09.01 Make center line measurements for outboard motor installation.
  - 09.02 Center the plate height.
  - 09.03 Locate manufacturers' I.D. plates.
  - 09.04 Mount control boxes at the helm.

- 09.05 Place wiring and cables in a neat and orderly manner.
  - 09.06 Adjust the control cables from the engine to the control box.
  - 09.07 Center the steering cable to the engine.
  - 09.08 Find suitable locations for accessories and mount them to the boat.
  - 09.09 Lubricate shafts, install propellers and fasten both securely.
  - 09.10 Check for proper levels.
  - 09.11 Check manufacturers' specifications.
  - 09.12 Test-run boats.
  - 09.13 Recheck work completed.
  - 09.14 Check manufacturers' installation procedures for stern drive units.
  - 09.15 Lubricate shafts and install propellers securely.
  - 09.16 Obtain maximum oil level capacity.
  - 09.17 Install or connect drain plugs, petcocks, hose clamps, hoses, etc.
  - 09.18 Find a suitable mount location and mount the engine securely in the boat.
  - 09.19 Set engines to manufacturers' specifications.
  - 09.20 Set, adjust and test engines to manufacturers' specifications.
  - 09.21 Remove and replace running lights.
  - 09.22 Troubleshoot lighting systems and accessories.
  - 09.23 Check and adjust throttles, cables, horns, lights and tachometers.
- 10.0 Parts specialist and computer skills to industry standards--The student will be able to:
- 10.01 Identify the skills needed to be a service writer.
  - 10.02 Identify the skills needed to be a parts specialist.
  - 10.03 Demonstrate appropriate computer skills.
  - 10.04 Identify gaskets and seals.
  - 10.05 Demonstrate knowledge of different parts and accessories.
- 11.0 Maintain and repair cooling systems--The student will be able to:
- 11.01 Explain the principles of cooling systems, including fresh water cooling systems.
  - 11.02 Trace water flow through cooling systems.
- 12.0 Maintain and repair lubrication systems--The student will be able to:
- 12.01 Identify the types and functions of lubrication systems.
  - 12.02 Explain the principles of lubrication systems.
  - 12.03 Identify and locate components of lubrication systems.
- 13.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 13.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 13.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 13.03 Construct charts/tables/graphs using functions and data. AF3.5
- 14.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 14.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1

- 14.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.AF4.3
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 15.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 15.02 Locate, organize and reference written information from various sources. CM 3.0
  - 15.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 15.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 15.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 15.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 15.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: MTE0050****Occupational Completion Point: B****Outboard Engine Technician (1 of 2) – 300 Hours – SOC Code 49-3051**

- 16.0 Perform gasket/seal operations and electronic test equipment skills to industry standards--The student will be able to:
- 16.01 Identify and make gaskets and seals.
  - 16.02 Demonstrate appropriate skills in computerized test equipment.
- 17.0 Maintain and repair basic two-stroke cycle outboard engines--The student will be able to:
- 17.01 Disassemble engines.
  - 17.02 Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
  - 17.03 Diagnose head problems by use of the visual inspection method.
  - 17.04 Diagnose head problems by use of the compression tester method.
  - 17.05 Diagnose head problems by use of cylinder air pressure method.
  - 17.06 Diagnose head problems by use of the stethoscope method.
  - 17.07 Remove, clean and inspect piston rods and assemblies.
  - 17.08 Measure out-of-round of pistons and cylinders.
  - 17.09 Hone cylinders.
  - 17.10 Check the total bearing surface of connecting rod bearings.
  - 17.11 Measure piston skirts and ring grooves.
  - 17.12 Measure the piston ring gap in cylinder bores.
  - 17.13 Install piston pins according to manufacturer's specifications.
  - 17.14 Check rod and piston assembly alignment.
  - 17.15 Install rings on pistons.
  - 17.16 Install piston rod assemblies.
  - 17.17 Measure and check crankshafts with a micrometer.
  - 17.18 Check needle bearings.
  - 17.19 Inspect crankshafts and install seal.
  - 17.20 Inspect, clean and/or replace reed valves.
  - 17.21 Reassemble engines.

18.0 Maintain and repair outboard fuel systems--The student will be able to:

- 18.01 Identify the major types of carburetors.
- 18.02 Check and adjust throttle and governor linkages.
- 18.03 Identify and service different types of EFI systems.
- 18.04 Remove, service and replace air cleaners.
- 18.05 Diagnose carburetor problems.

19.0 Maintain and repair outboard cooling systems--The student will be able to:

- 19.01 Disassemble and reassemble water pumps.
- 19.02 Remove, check and replace thermostats.
- 19.03 Use thermostat pressure relief systems.
- 19.04 Service manifolds and thermostat housings.

20.0 Maintain and repair outboard lubrication systems--The student will be able to:

- 20.01 Check engines for oil leaks.
- 20.02 Change engine oil and filters.
- 20.03 Check engine oil pressure and level.
- 20.04 Recognize and use only recommended oil.
- 20.05 Inspect and service oil-metering systems.

21.0 Maintain and repair outboard lower gear cases--The student will be able to:

- 21.01 Remove and replace lower gear cases.
- 21.02 Reshim lower gear cases.
- 21.03 Refill lower gear cases with specified oil.
- 21.04 Determine propeller pitch diameter and hub type.

22.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0

- 22.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 22.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 22.03 Present information formally and informally for specific purposes and audiences. AF2.9

23.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

- 23.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 23.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 23.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 23.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

- 24.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 24.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 24.02 Explain emergency procedures to follow in response to workplace accidents.
  - 24.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: MTE0070****Occupational Completion Point: C****Outboard Engine Technician (2 of 2) – 300 Hours – SOC Code 49-3051**

- 25.0 Maintain and repair outboard cranking systems--The student will be able to:
- 25.01 Disassemble recoil starters.
  - 25.02 Inspect components of recoil starters.
  - 25.03 Reassemble recoil starters.
  - 25.04 Identify components of electrical starting systems.
  - 25.05 Disassemble different types of starting motors.
  - 25.06 Bench test armatures.
  - 25.07 Bench test field coils.
  - 25.08 Bench test drive units.
  - 25.09 Bench test switches.
  - 25.10 Bench test minor parts of starting motor components.
  - 25.11 Install, reassemble and test new starter parts.
  - 25.12 Troubleshoot starting systems using battery starter testers.
  - 25.13 Set up and use battery starter (load) testers.
  - 25.14 Locate opens, short and grounds.
- 26.0 Maintain and repair outboard magneto ignition systems--The student will be able to:
- 26.01 Sketch and label electrical symbols.
  - 26.02 Set up and use ohmmeters.
  - 26.03 Set up and use voltmeters.
  - 26.04 Set up and use ignition testers.
  - 26.05 Set up and use ignition analyzers.
  - 26.06 Locate and identify parts of magneto ignitions.
  - 26.07 Locate and match electrical units by their symbols on a wiring diagram.
  - 26.08 Sketch and label complete magneto ignition systems.
  - 26.09 Check coil resistance with an ohmmeter.
  - 26.10 Check points for continuity and resistance.
  - 26.11 Check condensers for capacity, leaks and shorts.
  - 26.12 Clean and regap spark plugs.
- 27.0 Maintain and repair outboard battery ignition systems--The student will be able to:
- 27.01 Locate and identify parts of battery ignition systems.
  - 27.02 Locate and match electrical units by their symbols on a wiring diagram.
  - 27.03 Sketch and label complete battery ignition systems.
  - 27.04 Check coil resistance with an ohmmeter.

- 27.05 Check points for continuity and resistance.
  - 27.06 Check condensers for capacity, leaks and shorts.
  - 27.07 Set up and use test equipment.
  - 27.08 Set timing using timing light.
- 28.0 Maintain and repair outboard capacitor discharge ignition systems--The student will be able to:
- 28.01 Sketch and label electrical symbols.
  - 28.02 Set up and use ohmmeters.
  - 28.03 Set up and use a CD-77 or equivalent.
  - 28.04 Set up and use spark testers.
  - 28.05 Set up and use neon test lights.
  - 28.06 Set up and use low/high ammeters.
  - 28.07 Set up and use voltmeters.
  - 28.08 Locate and identify parts of capacitor discharge ignition systems.
  - 28.09 Locate and match electrical units by their symbols on a wiring diagram.
  - 28.10 Sketch and label complete C/D ignition systems.
  - 28.11 Check coil resistance, shorts and grounds with an ohmmeter.
  - 28.12 Check stator windings with an ohmmeter.
  - 28.13 Check sensor coils, charge coils, ignition coils and shorts to ground with a CD-77 or equivalent.
  - 28.14 Check power packs with an ohmmeter and a CD-77 equivalent.
- 29.0 Maintain and repair outboard charging systems--The student will be able to:
- 29.01 Sketch and label the units of complete charging circuits.
  - 29.02 Disassemble charging systems and identify the components.
  - 29.03 Perform stator and rectifier testing on charging systems.
  - 29.04 Reassemble and test charging systems.
  - 29.05 Set up and use ohmmeters.
  - 29.06 Test regulators.
  - 29.07 Reassemble and test complete units.
- 30.0 Perform outboard upper to lower gear case maintenance--The student will be able to:
- 30.01 Disassemble exhaust housings.
  - 30.02 Inspect seals, "O" rings, shafts and bearings.
  - 30.03 Reassemble exhaust housings.
- 31.0 Assemble and maintain outboard lower units and housing assemblies--The student will be able to:
- 31.01 Disassemble and reassemble steering handle groups.
  - 31.02 Disassemble and assemble exhaust housings and water tube assemblies.
  - 31.03 Replace motor mounts and shock absorbers.
  - 31.04 Lubricate all fittings.
  - 31.05 Pressure and vacuum test gear cases.
  - 31.06 Remove and test cylinders and rams.
  - 31.07 Adjust reverse locks.
  - 31.08 Adjust the trim and tilt.

- 31.09 Determine the differences between mechanical, electrical and hydraulic shifting units.
  - 31.10 Explain the shifting theory of the lower unit.
  - 31.11 Disassemble and reassemble mechanical shifting units.
  - 31.12 Disassemble and reassemble electrical shifting units.
  - 31.13 Disassemble and reassemble hydraulic shifting units.
  - 31.14 Inspect all parts for wear.
- 32.0 Use information technology tools. -- The students will be able to:
- 32.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 32.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 32.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 32.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 33.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 33.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 33.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 33.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 33.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 34.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 34.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 34.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 34.03 Develop a personal budget and financial goals. FL3.1
  - 34.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 34.05 Maintain financial records. FL3.3
  - 34.06 Read and reconcile financial statements. FL3.4
  - 34.07 Research, compare and contrast investment opportunities.

**Course Number: MTE0183**

**Occupational Completion Point: D**

**Stern Drive Technician – 150 Hours – SOC Code 49-3051**

- 35.0 Maintain and repair basic four-stroke cycle stern drive engines--The student will be able to:
- 35.01 Diagnose valve and head problems by use of the visual inspection method.
  - 35.02 Diagnose valve and head problems by use of the compression tester method.
  - 35.03 Diagnose valve and head problems by use of the cylinder air pressure method.



- 35.04 Disassemble engines and inspect parts.
- 35.05 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 35.06 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 35.07 Grind valve seats and reface valves.
- 35.08 Check and inspect springs for free height, distortion and installed height.
- 35.09 Adjust valve lash.
- 35.10 Move and inspect camshafts and lifters.
- 35.11 Measure camshafts.
- 35.12 Clean and inspect lifters for wear.
- 35.13 Time valve drive assemblies.
- 35.14 Remove pistons from rod assemblies.
- 35.15 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 35.16 Check piston pins and bosses for wear.
- 35.17 Measure piston ring lands width, out-of-round and taper.
- 35.18 Measure the piston ring gap in cylinder bores.
- 35.19 Install and fit piston pins.
- 35.20 Check rod and piston assembly alignment.
- 35.21 Remove and replace rod bearings.
- 35.22 Hone and clean cylinders.
- 35.23 Install rings on pistons.
- 35.24 Measure and check crankshafts with a micrometer.
- 35.25 Check for end play.
- 35.26 Check bearing bores with a telescoping gage.
- 35.27 Reassemble engines.
- 35.28 Install oil seals.

36.0 Maintain and repair stern drive fuel systems--The student will be able to:

- 36.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 36.02 Sketch and label the parts of total fuel systems.
- 36.03 Service fuel lines.
- 36.04 Remove, clean and install fuel tanks.
- 36.05 Identify and locate fuel pump vacuums.
- 36.06 Remove, replace service and check the pressure of fuel pumps.
- 36.07 Remove, clean and replace in-line filters.
- 36.08 Identify the major types of carburetors.
- 36.09 Check and adjust throttle and governor linkages.
- 36.10 Identify and service different types of EFI systems.
- 36.11 Identify and understand different types of evaporative control systems.

37.0 Maintain and repair stern drive cooling systems--The student will be able to:

- 37.01 Explain the principles of cooling systems, including fresh water cooling systems.
- 37.02 Trace water flow through cooling systems.
- 37.03 Disassemble and reassemble water pumps.
- 37.04 Remove, check and replace thermostats.
- 37.05 Use thermostat pressure relief systems.
- 37.06 Service manifolds, risers and thermostat housings.
- 37.07 Service water-cooling systems for gas inboard.

38.0 Maintain and repair stern drive lubrication systems--The student will be able to:

- 38.01 Identify the types and functions of lubrication systems.
  - 38.02 Explain the principles of lubrication systems.
  - 38.03 Identify and locate components of lubrication systems.
  - 38.04 Check engines for oil leaks.
  - 38.05 Change engine oil and filters.
  - 38.06 Check engine oil pressure and level.
  - 38.07 Recognize and use only recommended oil.
- 39.0 Maintain and repair stern drive upper gear case--The student will be able to:
- 39.01 Determine the differences between mechanical, electrical and hydraulic shifting units.
  - 39.02 Disassemble and reassemble each type of shifting unit.
  - 39.03 Reshim units to manufacturers' specifications.
  - 39.04 Use the proper oil to refill upper and lower gear cases.
- 40.0 Maintain and repair stern drive lower gear cases--The student will be able to:
- 40.01 Determine the differences between mechanical, electrical and hydraulic shifting.
  - 40.02 Remove and replace lower gear cases.
  - 40.03 Reshim lower gear cases.
  - 40.04 Refill lower gear cases with specified oil.
  - 40.05 Determine propeller pitch, diameter and hub type.
- 41.0 Maintain and repair stern drive battery ignition systems--The student will be able to:
- 41.01 Locate and match electrical units by their symbols on a wiring diagram.
  - 41.02 Sketch and label complete battery ignition systems.
  - 41.03 Set up and use test equipment.
  - 41.04 Set timing using a timing light
- 42.0 Maintain and repair stern drive capacitor discharge ignition systems--The student will be able to:
- 42.01 Sketch and label electrical symbols.
  - 42.02 Set up and use ohmmeters.
  - 42.03 Set up and use appropriate test equipment.
  - 42.04 Set up and use spark testers.
  - 42.05 Set up and use neon test lights.
  - 42.06 Set up and use low/high ammeters.
  - 42.07 Set up and use voltmeters.
  - 42.08 Locate and identify parts of capacitor discharge ignition systems.
  - 42.09 Locate and match electrical units by their symbols on a wiring diagram.
  - 42.10 Sketch and label complete C/D ignition systems.
  - 42.11 Check coil resistance, shorts and grounds with an ohmmeter.
  - 42.12 Check stator windings with an ohmmeter.
  - 42.13 Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment.
  - 42.14 Check power packs with an ohmmeter and appropriate test equipment.

- 43.0 Maintain and repair stern drive intermediate housings--The student will be able to:
- 43.01 Disassemble main drive shafts.
  - 43.02 Shim drive shafts to intermediate housings.
  - 43.03 Remove and replace clutch assemblies.
  - 43.04 Check electrical components with proper test equipment.
  - 43.05 Remove and replace "U" joints.
  - 43.06 Disassemble outer transom plates.
  - 43.07 Adjust trim and limit switches.
  - 43.08 Disassemble cylinder rams.
- 44.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 44.01 Describe the nature and types of business organizations. SY 1.0
  - 44.02 Explain the effect of key organizational systems on performance and quality.
  - 44.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 44.04 Explain the impact of the global economy on business organizations.
- 45.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 45.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 45.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 45.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 45.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 46.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 46.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 46.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 46.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 46.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 46.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 46.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 46.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 46.08 Research the benefits of ongoing professional development. ECD 9.0
  - 46.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: MTE0054**

**Occupational Completion Point: E**

**Inboard Gas Technician – 150 Hours – SOC Code 49-3051**

- 47.0 Perform parts manual activities to industry standards--The student will be able to:

47.01 Read and use parts manuals.

48.0 Maintain and repair basic four-stroke cycle inboard gas engines--The student will be able to:

- 48.01 Diagnose valve and head problems by use of the visual inspection method.
- 48.02 Diagnose valve and head problems by use of the compression tester method.
- 48.03 Diagnose valve and head problems by use of the cylinder air pressure method.
- 48.04 Disassemble engines and inspect parts.
- 48.05 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 48.06 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 48.07 Grind valve seats and reface valves.
- 48.08 Check and inspect springs for free height, distortion and installed height.
- 48.09 Adjust valve lash.
- 48.10 Remove and inspect camshafts and lifters.
- 48.11 Measure camshafts.
- 48.12 Clean and inspect lifters for wear.
- 48.13 Time valve drive assemblies.
- 48.14 Remove pistons from rod assemblies.
- 48.15 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 48.16 Check piston pins and bosses for wear.
- 48.17 Measure piston ring lands width, out-of-round and taper.
- 48.18 Measure the piston ring gap in cylinder bores.
- 48.19 Install and fit piston pins.
- 48.20 Check rod and piston assembly alignment.
- 48.21 Remove and replace rod bearings.
- 48.22 Hone and clean cylinders.
- 48.23 Install rings on pistons.
- 48.24 Measure and check crankshafts with a micrometer.
- 48.25 Check for end play.
- 48.26 Check bearing bores with a telescoping gage.
- 48.27 Reassemble engines.
- 48.28 Install oil seals.

49.0 Maintain and repair inboard fuel systems--The student will be able to:

- 49.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 49.02 Sketch and label the parts of total fuel systems.
- 49.03 Service fuel lines.
- 49.04 Remove, clean and install fuel tanks.
- 49.05 Identify and locate fuel pump vacuums.
- 49.06 Remove, replace service and check the pressure of fuel pumps.
- 49.07 Remove, clean and replace in-line filters.
- 49.08 Identify the major types of carburetors.
- 49.09 Check and adjust throttle and governor linkages.
- 49.10 Identify and service different types of EFI systems.
- 49.11 Identify and understand different types of evaporative control systems.

50.0 Maintain and repair inboard gas cooling systems--The student will be able to:

- 50.01 Explain the principles of cooling systems, including fresh water cooling systems.
- 50.02 Trace water flow through cooling systems.
- 50.03 Disassemble and reassemble water pumps.

- 50.04 Remove, check and replace thermostats.
- 50.05 Use thermostat pressure relief systems.
- 50.06 Service manifolds, risers and thermostat housings.
- 50.07 Service water-cooling systems for gas inboard, gas outboard and diesel engines.

51.0 Maintain and repair inboard gas lubrication systems--The student will be able to:

- 51.01 Identify the types and functions of lubrication systems.
- 51.02 Explain the principles of lubrication systems.
- 51.03 Identify and locate components of lubrication systems.
- 51.04 Check engines for oil leaks.
- 51.05 Change engine oil and filters.
- 51.06 Check engine oil pressure and level.
- 51.07 Recognize and use only recommended oil.

52.0 Maintain and repair inboard gas fuel systems--The student will be able to:

- 52.01 Remove, service and replace carburetor air cleaners/flame arrestors.
- 52.02 Identify and locate fuel system components (fuel pumps, carburetors and air filters, linkages and intake manifolds).
- 52.03 Remove, clean, overhaul, replace and make final adjustments to carburetors.

53.0 Maintain and repair transmissions--The student will be able to:

- 53.01 Inspect planetary clutch plate air coupling assemblies
- 53.02 Remove and replace transmissions.
- 53.03 Use proper service tools in shimming, reassembly and testing.
- 53.04 Drain transmissions.
- 53.05 Determine capacity using the transmission service manuals.
- 53.06 Refill transmissions according to manufacturers' specifications.

**Course Number: MTE0056**

**Occupational Completion Point: F**

**Inboard Diesel Technician – 150 Hours – SOC Code 49-3051**

54.0 Maintain and repair inboard diesel fuel systems--The student will be able to:

- 54.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 54.02 Sketch and label the parts of total fuel systems.
- 54.03 Service fuel lines.
- 54.04 Remove, clean and install fuel tanks.
- 54.05 Identify and locate fuel control devices.
- 54.06 Remove, replace service and check the pressure of fuel pumps.
- 54.07 Remove, clean and replace in-line filters.
- 54.08 Check and adjust throttle and governor linkages.
- 54.09 Check fuel systems for leaks.
- 54.10 Bleed systems for starting.
- 54.11 Adjust nozzle pressure to manufacturer's specifications.
- 54.12 Set the injection pump angle (timing).
- 54.13 Check or replace glow plugs.

54.14 Check; stop solenoids.

55.0 Maintain and repair inboard diesel cooling systems--The student will be able to:

- 55.01 Disassemble and reassemble water pumps.
- 55.02 Remove, check and replace thermostats.
- 55.03 Use thermostat pressure relief systems.
- 55.04 Service manifolds, risers and thermostat housings.
- 55.05 Service water-cooling systems for diesel engines.

56.0 Maintain and repair inboard diesel lubrication systems--The student will be able to:

- 56.01 Identify the types and functions of lubrication systems.
- 56.02 Explain the principles of lubrication systems.
- 56.03 Identify and locate components of lubrication systems.
- 56.04 Check engines for oil leaks.
- 56.05 Change engine oil and filters.
- 56.06 Check engine oil pressure and level.
- 56.07 Recognize and use only recommended oil.

57.0 Maintain and repair inboard diesel charging systems --The student will be able to:

- 57.01 Inspect, remove and replace alternator belts.
- 57.02 Check the output of charging systems.
- 57.03 Analyze malfunctions.
- 57.04 Test and overhaul alternators.
- 57.05 Remove and replace regulators.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 1  
**Course Number:** 8751010  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines and high performance related equipment.

01.0 Perform shop practices to industry standards--The student will be able to:

- 01.01 Comply with safety rules and regulations.
- 01.02 Use hand tools safely and properly.
- 01.03 Set up and use power tools safely and properly.
- 01.04 Set up and use precision measuring tools.
- 01.05 Drill and remove broken studs and install helicoils.
- 01.06 Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility.
- 01.07 Read, interpret and apply service manuals.
- 01.08 Locate and match electrical units by their symbols on a wiring diagram.
- 01.09 Demonstrate appropriate heating, cutting, and welding skills.

02.0 Maintain and repair basic four-stroke cycle engines--The student will be able to:

- 02.01 Explain the basic principles of the operation of four-stroke cycle internal combustion engines.
- 02.02 Identify types of four-stroke cycle engines.
- 02.03 Locate engine serial and model numbers.
- 02.04 Identify engine assemblies and systems.

03.0 Maintain and repair basic two-stroke cycle engines--The student will be able to:

- 03.01 Explain the basic principles of the operation of two-stroke cycle internal combustion engines.
- 03.02 Identify types of engines.
- 03.03 Locate engine serial and model numbers.
- 03.04 Identify engine assemblies and systems.

04.0 Maintain and repair electrical systems--The student will be able to:

- 04.01 Set up and use voltmeters, ammeters and ohmmeters.
- 04.02 Locate and identify electrical circuit components.
- 04.03 Sketch a typical circuit using a single wire system.
- 04.04 Test storage batteries using a hydrometer.
- 04.05 Test storage batteries using a light and load test

- 04.06 Charge storage batteries.
  - 04.07 Remove and replace batteries and service battery boxes.
  - 04.08 Repair damaged wire and electrical harnesses.
  - 04.09 Diagnose circuit troubles using continuity or a test light and low reading voltmeters to record voltage drop.
  - 04.10 Sketch and label typical fuel gage systems.
  - 04.11 Remove and replace ammeters or indicating lights.
  - 04.12 Remove and replace fuel gages.
  - 04.13 Remove and replace fuel sending units.
  - 04.14 Diagnose gages and accessory system troubles using test lights, voltmeters, ammeters or detached sending units.
  - 04.15 Sketch typical circuits such as those for auto bilge pumps or navigation lights.
  - 04.16 Locate opens, shorts and grounds.
  - 04.17 Demonstrate proficiency in soldering/splicing skills.
- 13.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 13.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 13.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 13.03 Construct charts/tables/graphs using functions and data. AF3.5
- 14.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 14.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 14.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 15.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 15.02 Locate, organize and reference written information from various sources. CM 3.0
  - 15.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 15.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 15.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 15.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 15.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 2  
**Course Number:** 8751020  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines' fuel systems.

05.0 Maintain and repair fuel systems--The student will be able to:

- 05.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 05.02 Sketch and label the parts of total fuel systems.
- 05.03 Service fuel lines and primer bulbs (vacuum test).
- 05.04 Remove, clean, inspect and install fuel tanks.
- 05.05 Identify basic carburetor circuits (chokes, floats, fuel inlets; idle, intermediate and high speeds; mains, etc.)
- 05.06 Identify and locate fuel pumps.
- 05.07 Determine and make appropriate fuel oil mixtures.

06.0 Maintain and repair two-stroke cycle carburetors--The student will be able to:

- 06.01 Remove, clean, overhaul, replace and make final adjustments to carburetors.
- 06.02 Diagnose exhaust problems such as back pressure and scavenging.

07.0 Use marine woods, metals, and fiberglass--The student will be able to:

- 07.01 Explain the hazards of a marine environment to woods, metals and fiberglass.
- 07.02 Explain a galvanic series.
- 07.03 Explain the theory for using given materials in boat repair activities.

08.0 Adjust and repair trailers--The student will be able to:

- 08.01 Make boat to trailer adjustments.
- 08.02 Remove and replace lighting systems.
- 08.03 Remove and replace wheel bearings and springs.
- 08.04 Remove and replace brakes.
- 08.05 Service and install trim and tilt systems.
- 08.06 Remove and test cylinder rams.
- 08.07 Adjust reverse locks.
- 08.08 Adjust the trim and tilt.

09.0 Prepare and deliver sales merchandise--The student will be able to:

- 09.01 Make center line measurements for outboard motor installation.

- 09.02 Center the plate height.
  - 09.03 Locate manufacturers' I.D. plates.
  - 09.04 Mount control boxes at the helm.
  - 09.05 Place wiring and cables in a neat and orderly manner.
  - 09.06 Adjust the control cables from the engine to the control box.
  - 09.07 Center the steering cable to the engine.
  - 09.08 Find suitable locations for accessories and mount them to the boat.
  - 09.09 Lubricate shafts, install propellers and fasten both securely.
  - 09.10 Check for proper levels.
  - 09.11 Check manufacturers' specifications.
  - 09.12 Test-run boats.
  - 09.13 Recheck work completed.
  - 09.14 Check manufacturers' installation procedures for stern drive units.
  - 09.15 Lubricate shafts and install propellers securely.
  - 09.16 Obtain maximum oil level capacity.
  - 09.17 Install or connect drain plugs, petcocks, hose clamps, hoses, etc.
  - 09.18 Find a suitable mount location and mount the engine securely in the boat.
  - 09.19 Set engines to manufacturers' specifications.
  - 09.20 Set, adjust and test engines to manufacturers' specifications.
  - 09.21 Remove and replace running lights.
  - 09.22 Troubleshoot lighting systems and accessories.
  - 09.23 Check and adjust throttles, cables, horns, lights and tachometers.
- 22.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 22.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 22.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 22.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 23.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 23.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 23.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 23.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 23.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 24.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 24.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 24.02 Explain emergency procedures to follow in response to workplace accidents.
  - 24.03 Create a disaster and/or emergency response plan. SHE 2.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 3  
**Course Number:** 8751030  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines' cooling and lubrication systems.

10.0 Parts specialist and computer skills to industry standards--The student will be able to:

- 10.01 Identify the skills needed to be a service writer.
- 10.02 Identify the skills needed to be a parts specialist.
- 10.03 Demonstrate appropriate computer skills.
- 10.04 Identify gaskets and seals.
- 10.05 Demonstrate knowledge of different parts and accessories.

11.0 Maintain and repair cooling systems--The student will be able to:

- 11.01 Explain the principles of cooling systems, including fresh water cooling systems.
- 11.02 Trace water flow through cooling systems.

12.0 Maintain and repair lubrication systems--The student will be able to:

- 12.01 Identify the types and functions of lubrication systems.
- 12.02 Explain the principles of lubrication systems.
- 12.03 Identify and locate components of lubrication systems.

16.0 Perform gasket/seal operations and electronic test equipment skills to industry standards--The student will be able to:

- 16.01 Identify and make gaskets and seals.
- 16.02 Demonstrate appropriate skills in computerized test equipment.

32.0 Use information technology tools. -- The students will be able to:

- 32.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 32.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 32.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 32.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

33.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 33.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 33.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 33.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 33.04 Interpret and explain written organizational policies and procedures. ELR 2.0

34.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- 34.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 34.02 Describe the effect of money management on personal and career goals. FL 3.0
- 34.03 Develop a personal budget and financial goals. FL3.1
- 34.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 34.05 Maintain financial records. FL3.3
- 34.06 Read and reconcile financial statements. FL3.4
- 34.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 4  
**Course Number:** 8751040  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines and high performance related equipment.

17.0 Maintain and repair basic two-stroke cycle outboard engines--The student will be able to:

- 17.01 Disassemble engines.
- 17.02 Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 17.03 Diagnose head problems by use of the visual inspection method.
- 17.04 Diagnose head problems by use of the compression tester method.
- 17.05 Diagnose head problems by use of cylinder air pressure method.
- 17.06 Diagnose head problems by use of the stethoscope method.
- 17.07 Remove, clean and inspect piston rods and assemblies.
- 17.08 Measure out-of-round of pistons and cylinders.
- 17.09 Hone cylinders.
- 17.10 Check the total bearing surface of connecting rod bearings.
- 17.11 Measure piston skirts and ring grooves.
- 17.12 Measure the piston ring gap in cylinder bores.
- 17.13 Install piston pins according to manufacturer's specifications.
- 17.14 Check rod and piston assembly alignment.
- 17.15 Install rings on pistons.
- 17.16 Install piston rod assemblies.
- 17.17 Measure and check crankshafts with a micrometer.
- 17.18 Check needle bearings.
- 17.19 Inspect crankshafts and install seal.
- 17.20 Inspect, clean and/or replace reed valves.
- 17.21 Reassemble engines.

18.0 Maintain and repair outboard fuel systems--The student will be able to:

- 18.01 Identify the major types of carburetors.
- 18.02 Check and adjust throttle and governor linkages.
- 18.03 Identify and service different types of EFI systems.
- 18.04 Remove, service and replace air cleaners.
- 18.05 Diagnose carburetor problems.

19.0 Maintain and repair outboard cooling systems--The student will be able to:

- 19.01 Disassemble and reassemble water pumps.

- 19.02 Remove, check and replace thermostats.
- 19.03 Use thermostat pressure relief systems.
- 19.04 Service manifolds and thermostat housings.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 5  
**Course Number:** 8751050  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines and high performance related equipment.

20.0 Maintain and repair outboard lubrication systems--The student will be able to:

- 20.01 Check engines for oil leaks.
- 20.02 Change engine oil and filters.
- 20.03 Check engine oil pressure and level.
- 20.04 Recognize and use only recommended oil.
- 20.05 Inspect and service oil metering systems.

21.0 Maintain and repair outboard lower gear cases--The student will be able to:

- 21.01 Remove and replace lower gear cases.
- 21.02 Reshim lower gear cases.
- 21.03 Refill lower gear cases with specified oil.
- 21.04 Determine propeller pitch diameter and hub type.

25.0 Maintain and repair outboard cranking systems--The student will be able to:

- 25.01 Disassemble recoil starters.
- 25.02 Inspect components of recoil starters.
- 25.03 Reassemble recoil starters.
- 25.04 Identify components of electrical starting systems.
- 25.05 Disassemble different types of starting motors.
- 25.06 Bench test armatures
- 25.07 Bench test field coils.
- 25.08 Bench test-drive units.
- 25.09 Bench test switches.
- 25.10 Bench test minor parts of starting motor components.
- 25.11 Install, reassemble and test new starter parts.
- 25.12 Troubleshoot starting systems using battery starter testers.
- 25.13 Set up and use battery starter (load) testers.
- 25.14 Locate opens, short and grounds.

26.0 Maintain and repair outboard magneto ignition systems--The student will be able to:

- 26.01 Sketch and label electrical symbols.
- 26.02 Set up and use ohmmeters.

- 26.03 Set up and use voltmeters.
- 26.04 Set up and use ignition testers.
- 26.05 Set up and use ignition analyzers.
- 26.06 Locate and identify parts of magneto ignitions.
- 26.07 Locate and match electrical units by their symbols on a wiring diagram.
- 26.08 Sketch and label complete magneto ignition systems.
- 26.09 Check coil resistance with an ohmmeter.
- 26.10 Check points for continuity and resistance.
- 26.11 Check condensers for capacity, leaks and shorts.
- 26.12 Clean and gap spark plugs.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 6  
**Course Number:** 8751060  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines' ignition and electrical systems.

27.0 Maintain and repair outboard battery ignition systems--The student will be able to:

- 27.01 Locate and identify parts of battery ignition systems.
- 27.02 Locate and match electrical units by their symbols on a wiring diagram.
- 27.03 Sketch and label complete battery ignition systems.
- 27.04 Check coil resistance with an ohmmeter.
- 27.05 Check points for continuity and resistance.
- 27.06 Check condensers for capacity, leaks and shorts.
- 27.07 Set up and use test equipment.
- 27.08 Set timing using timing light.

28.0 Maintain and repair outboard capacitor discharge ignition systems--The student will be able to:

- 28.01 Sketch and label electrical symbols.
- 28.02 Set up and use ohmmeters.
- 28.03 Set up and use a CD-77 or equivalent.
- 28.04 Set up and use spark testers.
- 28.05 Set up and use neon test lights.
- 28.06 Set up and use low/high ammeters.
- 28.07 Set up and use voltmeters.
- 28.08 Locate and identify parts of capacitor discharge ignition systems.
- 28.09 Locate and match electrical units by their symbols on a wiring diagram.
- 28.10 Sketch and label complete C/D ignition systems.
- 28.11 Check coil resistance, shorts and grounds with an ohmmeter.
- 28.12 Check stator windings with an ohmmeter.
- 28.13 Check sensor coils, charge coils, ignition coils and shorts to ground with a CD-77 or equivalent.
- 28.14 Check power packs with an ohmmeter and a CD-77 equivalent.

29.0 Maintain and repair outboard charging systems--The student will be able to:

- 29.01 Sketch and label the units of complete charging circuits.
- 29.02 Disassemble charging systems and identify the components.
- 29.03 Perform stator and rectifier testing on charging systems.
- 29.04 Reassemble and test charging systems.
- 29.05 Set up and use ohmmeters.

- 29.06 Test regulators.
- 29.07 Reassemble and test complete units.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 7  
**Course Number:** 8751070  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines' upper and lower gear case assemblies.

30.0 Perform outboard upper to lower gear case maintenance--The student will be able to:

- 30.01 Disassemble exhaust housings.
- 30.02 Inspect seals, "O" rings, shafts and bearings.
- 30.03 Reassemble exhaust housings.

31.0 Assemble and maintain outboard lower units and housing assemblies--The student will be able to:

- 31.01 Disassemble and reassemble steering handle groups.
- 31.02 Disassemble and assemble exhaust housings and water tube assemblies.
- 31.03 Replace motor mounts and shock absorbers.
- 31.04 Lubricate all fittings.
- 31.05 Pressure and vacuum test gear cases.
- 31.06 Remove and test cylinders and rams. Adjust reverse locks.
- 31.07 Adjust the trim and tilt.
- 31.08 Determine the differences between mechanical, electrical and hydraulic shifting units.
- 31.09 Explain the shifting theory of the lower unit.
- 31.10 Disassemble and reassemble mechanical shifting units.
- 31.11 Disassemble and reassemble electrical shifting units.
- 31.12 Disassemble and reassemble hydraulic shifting units.
- 31.13 Inspect all parts for wear.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 8  
**Course Number:** 8751080  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines' stern drive repair.

35.0 Maintain and repair basic four-stroke cycle stern drive engines--The student will be able to:

- 35.01 Diagnose valve and head problems by use of the visual inspection method.
- 35.02 Diagnose valve and head problems by use of the compression tester method.
- 35.03 Diagnose valve and head problems by use of the cylinder air pressure method.
- 35.04 Disassemble engines and inspect parts.
- 35.05 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 35.06 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 35.07 Grind valve seats and reface valves.
- 35.08 Check and inspect springs for free height, distortion and installed height.
- 35.09 Adjust valve lash.
- 35.10 Move and inspect camshafts and lifters.
- 35.11 Measure camshafts.
- 35.12 Clean and inspect lifters for wear.
- 35.13 Time valve drive assemblies.
- 35.14 Remove pistons from rod assemblies.
- 35.15 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 35.16 Check piston pins and bosses for wear.
- 35.17 Measure piston ring lands width, out-of-round and taper.
- 35.18 Measure the piston ring gap in cylinder bores.
- 35.19 Install and fit piston pins.
- 35.20 Check rod and piston assembly alignment.
- 35.21 Remove and replace rod bearings.
- 35.22 Hone and clean cylinders.
- 35.23 Install rings on pistons.
- 35.24 Measure and check crankshafts with a micrometer.
- 35.25 Check for end play.
- 35.26 Check bearing bores with a telescoping gage.
- 35.27 Reassemble engines.
- 35.28 Install oil seals.

36.0 Maintain and repair stern drive fuel systems--The student will be able to:

- 36.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 36.02 Sketch and label the parts of total fuel systems.
- 36.03 Service fuel lines.

- 36.04 Remove, clean and install fuel tanks.
  - 36.05 Identify and locate fuel pump vacuums.
  - 36.06 Remove, replace service and check the pressure of fuel pumps.
  - 36.07 Remove, clean and replace in-line filters.
  - 36.08 Identify the major types of carburetors.
  - 36.09 Check and adjust throttle and governor linkages.
  - 36.10 Identify and service different types of EFI systems.
  - 36.11 Identify and understand different types of evaporative control systems.
- 37.0 Maintain and repair stern drive cooling systems--The student will be able to:
- 37.01 Explain the principles of cooling systems, including fresh water cooling systems.
  - 37.02 Trace water flow through cooling systems.
  - 37.03 Disassemble and reassemble water pumps.
  - 37.04 Remove, check and replace thermostats.
  - 37.05 Use thermostat pressure relief systems.
  - 37.06 Service manifolds, risers and thermostat housings.
  - 37.07 Service water-cooling systems for gas inboard.
- 38.0 Maintain and repair stern drive lubrication systems--The student will be able to:
- 38.01 Identify the types and functions of lubrication systems.
  - 38.02 Explain the principles of lubrication systems.
  - 38.03 Identify and locate components of lubrication systems.
  - 38.04 Check engines for oil leaks.
  - 38.05 Change engine oil and filters.
  - 38.06 Check engine oil pressure and level.
  - 38.07 Recognize and use only recommended oil.
- 39.0 Maintain and repair stern drive upper gear case--The student will be able to:
- 39.01 Determine the differences between mechanical, electrical and hydraulic shifting units.
  - 39.02 Disassemble and reassemble each type of shifting unit.
  - 39.03 Reshim units to manufacturers' specifications.
  - 39.04 Use the proper oil to refill upper and lower gear cases.
- 40.0 Maintain and repair stern drive lower gear cases--The student will be able to:
- 40.01 Determine the differences between mechanical, electrical and hydraulic shifting.
  - 40.02 Remove and replace lower gear cases.
  - 40.03 Reshim lower gear cases.
  - 40.04 Refill lower gear cases with specified oil.
  - 40.05 Determine propeller pitch, diameter and hub type.
- 41.0 Maintain and repair stern drive battery ignition systems--The student will be able to:
- 41.01 Locate and match electrical units by their symbols on a wiring diagram.
  - 41.02 Sketch and label complete battery ignition systems.
  - 41.03 Set up and use test equipment.
  - 41.04 Set timing using timing light.

- 42.0 Maintain and repair stern drive capacitor discharge ignition systems--The student will be able to:
- 42.01 Sketch and label electrical symbols.
  - 42.02 Set up and use ohmmeters.
  - 42.03 Set up and use appropriate test equipment.
  - 42.04 Set up and use spark testers.
  - 42.05 Set up and use neon test lights.
  - 42.06 Set up and use low/high ammeters.
  - 42.07 Set up and use voltmeters.
  - 42.08 Locate and identify parts of capacitor discharge ignition systems.
  - 42.09 Locate and match electrical units by their symbols on a wiring diagram.
  - 42.10 Sketch and label complete C/D ignition systems.
  - 42.11 Check coil resistance, shorts and grounds with an ohmmeter.
  - 42.12 Check stator windings with an ohmmeter.
  - 42.13 Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment.
  - 42.14 Check power packs with an ohmmeter and appropriate test equipment.
- 43.0 Maintain and repair stern drive intermediate housings--The student will be able to:
- 43.01 Disassemble main drive shafts.
  - 43.02 Shim drive shafts to intermediate housings.
  - 43.03 Remove and replace clutch assemblies.
  - 43.04 Check electrical components with proper test equipment.
  - 43.05 Remove and replace "U" joints.
  - 43.06 Disassemble outer transom plates.
  - 43.07 Adjust trim and limit switches.
  - 43.08 Disassemble cylinder rams.
- 44.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 44.01 Describe the nature and types of business organizations. SY 1.0
  - 44.02 Explain the effect of key organizational systems on performance and quality.
  - 44.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 44.04 Explain the impact of the global economy on business organizations.
- 45.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 45.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 45.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 45.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 45.04 Employ mentoring skills to inspire and teach others. LT 5.0

46.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 46.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 46.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 46.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 46.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 46.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 46.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 46.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 46.08 Research the benefits of ongoing professional development. ECD 9.0
- 46.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

47.0 Perform parts manual activities to industry standards--The student will be able to:

- 47.01 Read and use parts manuals.

48.0 Maintain and repair basic four-stroke cycle inboard gas engines--The student will be able to:

- 48.01 Diagnose valve and head problems by use of the visual inspection method.
- 48.02 Diagnose valve and head problems by use of the compression tester method.
- 48.03 Diagnose valve and head problems by use of the cylinder air pressure method.
- 48.04 Disassemble engines and inspect parts.
- 48.05 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 48.06 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 48.07 Grind valve seats and reface valves.
- 48.08 Check and inspect springs for free height, distortion and installed height.
- 48.09 Adjust valve lash.
- 48.10 Remove and inspect camshafts and lifters.
- 48.11 Measure camshafts.
- 48.12 Clean and inspect lifters for wear.
- 48.13 Time valve drive assemblies.
- 48.14 Remove pistons from rod assemblies.
- 48.15 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 48.16 Check piston pins and bosses for wear.
- 48.17 Measure piston ring lands width, out-of-round and taper.
- 48.18 Measure the piston ring gap in cylinder bores.
- 48.19 Install and fit piston pins.
- 48.20 Check rod and piston assembly alignment.
- 48.21 Remove and replace rod bearings.
- 48.22 Hone and clean cylinders.
- 48.23 Install rings on pistons.
- 48.24 Measure and check crankshafts with a micrometer.
- 48.25 Check for end play.
- 48.26 Check bearing bores with a telescoping gage.
- 48.27 Reassemble engines.
- 48.28 Install oil seals.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Marine Service 9  
**Course Number:** 8751090  
**Course Credit:** 1

**Course Description:**

Students will learn entry-level skills for the marine industry to be a marine technician. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of 2 and 4 cycle internal combustion engines' maintenance and repair.

49.0 Maintain and repair inboard fuel systems--The student will be able to:

- 49.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 49.02 Sketch and label the parts of total fuel systems.
- 49.03 Service fuel lines.
- 49.04 Remove, clean and install fuel tanks.
- 49.05 Identify and locate fuel pump vacuums.
- 49.06 Remove, replace service and check the pressure of fuel pumps.
- 49.07 Remove, clean and replace in-line filters.
- 49.08 Identify the major types of carburetors.
- 49.09 Check and adjust throttle and governor linkages.
- 49.10 Identify and service different types of EFI systems.
- 49.11 Identify and understand different types of evaporative control systems.

50.0 Maintain and repair inboard gas cooling systems--The student will be able to:

- 50.01 Explain the principles of cooling systems, including fresh water cooling systems.
- 50.02 Trace water flow through cooling systems.
- 50.03 Disassemble and reassemble water pumps.
- 50.04 Remove, check and replace thermostats.
- 50.05 Use thermostat pressure relief systems. )
- 50.06 Service manifolds, risers and thermostat housings.
- 50.07 Service water-cooling systems for gas inboard, gas outboard and diesel engines.

51.0 Maintain and repair inboard gas lubrication systems--The student will be able to:

- 51.01 Identify the types and functions of lubrication systems.
- 51.02 Explain the principles of lubrication systems.
- 51.03 Identify and locate components of lubrication systems.
- 51.04 Check engines for oil leaks.
- 51.05 Change engine oil and filters.
- 51.06 Check engine oil pressure and level.
- 51.07 Recognize and use only recommended oil.

52.0 Maintain and repair inboard gas fuel systems--The student will be able to:

- 52.01 Remove, service and replace carburetor air cleaners/flame arrestors.



- 52.02 Identify and locate fuel system components (fuel pumps, carburetors and air filters, linkages and intake manifolds).
- 52.03 Remove, clean, overhaul, replace and make final adjustments to carburetors.

53.0 Maintain and repair transmissions--The student will be able to:

- 53.01 Inspect planetary clutch plate air coupling assemblies.
- 53.02 Remove and replace transmissions.
- 53.03 Use proper service tools in shimming, reassembly and testing.
- 53.04 Drain transmissions.
- 53.05 Determine capacity using the transmission service manuals.
- 53.06 Refill transmissions according to manufacturers' specifications.

54.0 Maintain and repair inboard diesel fuel systems--The student will be able to:

- 54.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 54.02 Sketch and label the parts of total fuel systems.
- 54.03 Service fuel lines.
- 54.04 Remove, clean and install fuel tanks.
- 54.05 Identify and locate fuel control devices.
- 54.06 Remove, replace service and check the pressure of fuel pumps.
- 54.07 Remove, clean and replace in-line filters.
- 54.08 Check and adjust throttle and governor linkages.
- 54.09 Check fuel systems for leaks.
- 54.10 Bleed systems for starting.
- 54.11 Adjust nozzle pressure to manufacturer's specifications.
- 54.12 Set the injection pump angle (timing).
- 54.13 Check or replace glow plugs.
- 54.14 Check; stop solenoids.

55.0 Maintain and repair inboard diesel cooling systems--The student will be able to:

- 55.01 Disassemble and reassemble water pumps.
- 55.02 Remove, check and replace thermostats.
- 55.03 Use thermostat pressure relief systems.
- 55.04 Service manifolds, risers and thermostat housings.
- 55.05 Service water-cooling systems for diesel engines.

56.0 Maintain and repair inboard diesel lubrication systems--The student will be able to:

- 56.01 Identify the types and functions of lubrication systems.
- 56.02 Explain the principles of lubrication systems.
- 56.03 Identify and locate components of lubrication systems.
- 56.04 Check engines for oil leaks.
- 56.05 Change engine oil and filters.
- 56.06 Check engine oil pressure and level.
- 56.07 Recognize and use only recommended oil.

57.0 Maintain and repair inboard diesel charging systems --The student will be able to:

- 57.01 Inspect, remove and replace alternator belts.

- 57.02 Check the output of charging systems.
- 57.03 Analyze malfunctions.
- 57.04 Test and overhaul alternators.
- 57.05 Remove and replace regulators.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Commercial Fishing  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	8751200	I490303
CIP Number	0649030300	0649030300
Grade Level	9-12, 30, 31	30, 31
Standard Length	5 Credits	750 Hours
Teacher Certification	COMM FISH @7 G	COMM FISH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	53-5021	53-5021
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, crew duties on seagoing boats, trailers, and small ships. Included are vessel operation and maintenance, vessel navigation, vessel handling, shrimp and net fishing, pot and line fishing, and galley operation/food preparation.

## Program Structure

This program is a planned sequence of instruction consisting of two OCP's.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0880	Officer Or Fishing Vessel Captain 1	375	53-5021
B	MTE0881	Officer Or Fishing Vessel Captain 2	375	53-5021

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
	8751210	Commercial Fishing 1	1 credit	53-5021	2
A	8751220	Commercial Fishing 2	1 credit	53-5021	2
	8751230	Commercial Fishing 3	1 credit	53-5021	2
	8751240	Commercial Fishing 4	1 credit	53-5021	2
B	8751250	Commercial Fishing 5	1 credit	53-5021	2

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for initial employment as an officer or fishing vessel captain (SOC 53-5021).

The plan of instruction prepares individuals for crew duties on seagoing boats, barges and ships. Included are boat operation, fishing operations, cleaning and preservation, loading and unloading and emergency procedures.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Fishing industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

## Standards

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

- 01.0 Unlock and get a vessel underway.
- 02.0 Dock a vessel.
- 03.0 Operate a vessel at sea.
- 04.0 Maneuver around offshore structures.
- 05.0 Anchor vessel.
- 06.0 Manage and perform cargo-handling duties.
- 07.0 Demonstrate language arts knowledge and skills
- 08.0 Demonstrate mathematics knowledge and skills.
- 09.0 Demonstrate science knowledge and skills
- 10.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 11.0 Solve problems using critical thinking skills, creativity and innovation.
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 13.0 Perform shrimp boat deckhand duties.
- 14.0 Perform net fisher duties.
- 15.0 Perform pot fisher duties.
- 16.0 Perform line fisher duties.
- 17.0 Bring vessel into port.
- 18.0 Perform crew operational and maintenance duties aboard a vessel in port.
- 19.0 Prepare meals aboard vessel.
- 20.0 Plan and perform emergency procedures.
- 21.0 Use information technology tools
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 23.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 24.0 Describe the importance of professional ethics and legal responsibilities.
- 25.0 Explain the importance of employability and entrepreneurship skills
- 26.0 Demonstrate personal money-management concepts, procedures, and strategies

2011 – 2012

**Florida Department of Education  
Student Performance Standards****Program Title: Commercial Fishing  
PSAV Number: I490303****Course Number: MTE0880  
Occupational Completion Point: A  
Officer Or Fishing Vessel Captain 1 – 375 Hours – SOC Code 53-5021**01.0 Unlock and get vessel underway--The student will be able to:

- 01.01 Bleed air compressor of water.
- 01.02 Check and maintain batteries.
- 01.03 Measure fuel in day tank.
- 01.04 Maintain proper level of coolant in expansion tank.
- 01.05 Determine if all navigation lights are functioning.
- 01.06 Tighten engine mounts.
- 01.07 Inspect water level indicators for cleanliness.
- 01.08 Test marine radio equipment.
- 01.09 Inspect antenna for physical damage.
- 01.10 Determine if hydraulic steering equipment is free of air and water.
- 01.11 Inspect fire-fighting equipment for excessive wear, proper location, and prescribed type.
- 01.12 Inspect buoyant apparatus for excessive wear, proper location and prescribed type.
- 01.13 Determine that rudder-stuffing box is functioning properly.
- 01.14 Tighten propeller stuffing box.
- 01.15 Inspect vessel for fuel leakage.
- 01.16 Prepare list of equipment to be checked for oil leakage.
- 01.17 Determine if proper voltage is being generated.
- 01.18 Maneuver vessel from berth into navigable waterway.
- 01.19 Pump out bilges.
- 01.20 Secure loose deck equipment.
- 01.21 Secure watertight doors, hatches, vents and skylights.

02.0 Dock a vessel--The student will be able to:

- 02.01 Assign crewmembers positions for mooring vessel.
- 02.02 Cast off vessel's mooring lines while remaining on dock.
- 02.03 Cast off vessel's mooring lines while remaining aboard vessel.
- 02.04 Tie various knots used in maritime operations.
- 02.05 Maneuver vessel to dock.
- 02.06 Release towing gear aboard towing vessel and barges.
- 02.07 Secure mooring lines to dock.
- 02.08 Secure mooring lines to vessel.
- 02.09 Secure engine room.
- 02.10 Secure propeller shaft.
- 02.11 Inspect engine room equipment for proper maintenance and safety.
- 02.12 Correct nautical chart prior to departure.



- 02.13 Prepare vessel to take on fuel and lube oil.
- 02.14 Prepare to take on water aboard vessel.
- 02.15 Splice eye into line.

03.0 Operate vessel at sea--The student will be able to:

- 03.01 Act as vessel's lookout.
- 03.02 Determine if electrical connections and outlets are tight and dry.
- 03.03 Determine if electrical outlets have proper voltage.
- 03.04 Change air filters on engines.
- 03.05 Change oil and fuel filters on engines.
- 03.06 Change oil in engines.
- 03.07 Demonstrate knowledge of the rules of the road in operating a vessel.
- 03.08 Determine time of arrival when current effect is known.
- 03.09 Determine time of arrival when current effect is unknown.
- 03.10 Display day or night signals for different towing situations.
- 03.11 Inspect heaving lines, mooring lines, and fixed and running rigging for excessive wear.
- 03.12 Clean engine room and its equipment.
- 03.13 Determine Greenwich Mean Time (GMT) by using vessel's chronometer.
- 03.14 Determine position by using Omega navigation system or equipment.
- 03.15 Steer a course by using the magnetic compass.
- 03.16 Operate radar equipment.
- 03.17 Interpret basic meteorological data.
- 03.18 Determine "distance off" by using angular measurements.
- 03.19 Establish a vessel's dead reckoning (DR) track.
- 03.20 Determine position by means of celestial navigation.
- 03.21 Plot position by using Loran and Loran overprint charts.
- 03.22 Set sea watches.
- 03.23 Chip and paint vessel.

04.0 Maneuver around offshore structures--The student will be able to:

- 04.01 Assist personnel in boarding personnel basket.
- 04.02 Maneuver vessel to discharge passengers.
- 04.03 Maneuver vessel to discharge cargo.
- 04.04 Secure hoses on board vessel.
- 04.05 Secure lashings, hawsers, or mooring lines on board vessel.

05.0 Anchor vessel--The student will be able to:

- 05.01 Anchor vessel.
- 05.02 Maneuver vessel to anchorage area.
- 05.03 Anchor vessel by using anchor winch.
- 05.04 Anchor vessel by using anchor windlass.
- 05.05 Stack (tier) anchor chain in chain locker.

06.0 Manage and perform cargo handling duties--The student will be able to:

- 06.01 Adjust vessel's mooring lines to allow for variations of tides and current.
- 06.02 Determine if all cargo is aboard.

- 06.03 Determine if all deck cargo is secured.
- 06.04 Determine if vessel is loaded in compliance with stability laws.
- 06.05 Discharge cargo by using bulk cargo system.
- 06.06 Load cargo by using bulk cargo system.
- 06.07 Prepare list of lost or damaged cargo.
- 07.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 07.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 07.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 07.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 08.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 08.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 08.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 08.03 Construct charts/tables/graphs using functions and data. AF3.5
- 09.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 09.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 09.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 10.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 10.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 10.02 Locate, organize and reference written information from various sources. CM 3.0
- 10.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 10.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 10.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 10.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 10.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 11.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 11.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 11.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 11.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 11.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 12.02 Explain emergency procedures to follow in response to workplace accidents.
  - 12.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: MTE0881****Occupational Completion Point: B****Officer Or Fishing Vessel Captain 2 – 375 Hours – SOC Code 53-5021**

- 13.0 Perform shrimp boat deckhand duties--The student will be able to:
- 13.01 Stand lookout, steering, and engine room watches.
  - 13.02 Attach nets, slings, hooks, and other lifting devices to cables, booms, and hoists.
  - 13.03 Load equipment and supplies aboard vessel by hand or using hoisting equipment.
  - 13.04 Signal other workers to move, hoist, and position loads.
  - 13.05 Row boats and dinghies and operate skiffs to transport fishers, and to tow and position nets.
  - 13.06 Attach accessories, such as floats, weights, and markers to nets and lines.
  - 13.07 Pull and guide nets and lines onto vessel.
  - 13.08 Remove shrimp from nets.
  - 13.09 Sort and clean marine life and return undesirable and illegal catch to the sea.
  - 13.10 Operate brine tank and refrigeration equipment.
  - 13.11 Place catch in containers and store in hold and cover with salt and ice.
  - 13.12 Wash decks, conveyors, knives, and other equipment, using brush, detergent, and water.
  - 13.13 Lubricate, adjust, and make minor repairs to engines and equipment.
- 14.0 Perform net fisher duties--The student will be able to:
- 14.01 Catch finfish, shellfish, and other marine life alone or as crew.
  - 14.02 Use and operate equipment such as dip, diver, gill, hoop, lampara, pound, trap, reef, trammel, and travel nets.
  - 14.03 Use and operate equipment such as purse seine, haul, drag, or beach seine.
  - 14.04 Insert and attach hoops, rods, poles, ropes, floats, weights, beam runners, other boards, and cables to form, reinforce, position, set tow and anchor net.
  - 14.05 Attach flags and lights to buoys to identify net location.
  - 14.06 Put net into water and anchor or tow net according to kind of net used, location of fishing area, and method of fishing.
  - 14.07 Haul net to boat or shore manually and using winch.
  - 14.08 Empty catch from net, using dip net, brail bucket, hydraulic pump, and conveyor, and by lifting net, using block and tackle, and dumping catch.
  - 14.09 Store catch in hold and containers, or transfer catch to base ship or bigger boat.
  - 14.10 Ride in skiff and hold end of net as base ship discharges net to surround school of fish or other seafood.
  - 14.11 Sort and clean fish.
  - 14.12 Repair fishing nets and gear.

- 14.13 Act as lookout or observe instruments to sight schools of fish.
- 15.0 Perform pot fisher duties--The student will be able to:
  - 15.01 Fish for marine life, including crab, eel, or lobster, using pots (cages with funnel-shaped net openings).
  - 15.02 Tie marker float to line, attach line to pot, fasten bait inside pot, and lower pot into water.
  - 15.03 Hook marker float with pole and pull up pot.
  - 15.04 Reach through hinged door of pot to remove catch or dump catch on deck.
  - 15.05 Measure catch with fixed gauge to insure compliance with legal size.
  - 15.06 Place legal catch in container and toss illegal catch overboard.
  - 15.07 Place peg in hinge of claws to prevent lobsters in container from killing each other.
  - 15.08 Rig and lower dredge (rake scoop with bag net attached), drag dredge behind boat to gather marine life from water bottom, and hoist it to deck by hand using block and tackle.
- 16.0 Perform line fisher duties--The student will be able to:
  - 16.01 Catch fish and other marine life with hooks and lines, working alone or as a member of crew.
  - 16.02 Lay out line and attach hooks, bait, sinkers, and various anchors, floats, and swivels, depending on quarry sought.
  - 16.03 Put line into water, and hold, anchor, or troll (tow) line to catch fish.
  - 16.04 Haul line onto boat deck by hand, reel, or synch, and remove catch.
  - 16.05 Store catch in hold or boxes and pack catch in ice.
  - 16.06 Hit fish with club to stun it before removing it from hook.
  - 16.07 Use gaff to assist in hauling fish from water.
  - 16.08 Slit fish, remove viscera, and wash cavity to clean fish for storage.
  - 16.09 Steer vessel in fishing area.
- 17.0 Bring vessel into port--The student will be able to:
  - 17.01 Determine approximate position and hazardous conditions by using fathometer.
  - 17.02 Determine position by using radio direction finder (RDF).
  - 17.03 Determine vessel's course and position against dead reckoning plots.
- 18.0 Perform crew operational and maintenance duties aboard vessel in port--The student will be able to:
  - 18.01 Arrange for dry-docking a vessel.
  - 18.02 Change brushes in auxiliary engines.
  - 18.03 Change lube oil filters on auxiliary engines.
  - 18.04 Change fuel filters on auxiliary engines.
  - 18.05 Clean electric motor.
  - 18.06 Prepare list of hoses, valves, connections, gaskets, and tanks needing repairs.
  - 18.07 Determine if const-a-voltage regulator is functioning properly.
  - 18.08 Determine if drive bolts on air compressors are excessively loose.
  - 18.09 Tighten panel box fittings to prevent vibration.
  - 18.10 Clean keel cool strainers.

- 18.11 Clean oil coolers.
- 18.12 Clean oil strainers in marine gears.
- 18.13 Drain water out of fuel traps.
- 18.14 Tighten fuel and oil line connections on engines.
- 18.15 Inspect day tanks containing fuel for leaks.
- 18.16 Lubricate deck and engine room equipment on a regular schedule.
- 18.17 Determine vessel's manning requirements.
- 18.18 Wash down vessel's superstructure and decks.

19.0 Prepare meals aboard vessel--The student will be able to:

- 19.01 Make yeast breads.
- 19.02 Make pie crust.
- 19.03 Make cream filling in pie.
- 19.04 Make pancakes.
- 19.05 Make corn bread.
- 19.06 Make cakes.
- 19.07 Make biscuits.
- 19.08 Clean galley deck, woodwork, and cabinets.
- 19.09 Wash dishes, glasses, flatware, trays, pots and pans.
- 19.10 Cook vegetables by boiling, simmering and steaming.
- 19.11 Cook meats, seafood, and fowl by frying.
- 19.12 Cook meats, seafood, and fowl by stewing and braising.
- 19.13 Cook meats, seafood, and fowl by broiling.
- 19.14 Cook meats, seafood, and fowl by roasting or baking.
- 19.15 Cook meats, seafood, and fowl by braising.
- 19.16 Season and bread meats, seafood, and fowl for baking, roasting, broiling and frying.
- 19.17 Cook eggs by frying and scrambling.
- 19.18 Make gravies.
- 19.19 Make coffee.
- 19.20 Make salads.
- 19.21 Prepare soup stock.
- 19.22 Prepare sandwiches.
- 19.23 Prepare dehydrated or concentrated foods.
- 19.24 Make soup with stock, meats, vegetables, and seasonings, as required by recipe.
- 19.25 Carve cooled meats.
- 19.26 Cut, trim, and bone beef, lamb, pork, or fish into prescribed portions for steaks, chops, and fillets.
- 19.27 Clean and care for equipment.
- 19.28 Order food.
- 19.29 Plan menu.
- 19.30 Keep records for purchasing foods.
- 19.31 Store food.
- 19.32 Keep continuous inventory of food items.

20.0 Plan and perform emergency procedures--The student will be able to:

- 20.01 Act as lookout to keep person in sight who has been lost overboard.
- 20.02 Administer first aid to prevent shock.
- 20.03 Administer first aid to control bleeding.

- 20.04 Administer CPR.
  - 20.05 Launch lifeboat and life raft.
  - 20.06 Close emergency fuel shutoff valves.
  - 20.07 Extinguish class A, B, and C type fires.
  - 20.08 Maneuver life raft or lifeboat away from vessel.
  - 20.09 Maneuver vessel to return to area in which person was lost overboard.
  - 20.10 Issue life preservers for use by passengers and crew.
  - 20.11 Secure engine room to prevent spread of fire.
  - 20.12 Send out distress signals.
  - 20.13 Sound abandon-ship alarm.
  - 20.14 Train crew to perform emergency procedures.
- 21.0 Use information technology tools. -- The students will be able to:
- 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 22.01 Describe the nature and types of business organizations. SY 1.0
  - 22.02 Explain the effect of key organizational systems on performance and quality.
  - 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 22.04 Explain the impact of the global economy on business organizations.
- 23.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 23.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 23.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 23.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 23.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 24.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 24.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 24.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 24.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 24.04 Interpret and explain written organizational policies and procedures. ELR 2.0

25.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 25.08 Research the benefits of ongoing professional development. ECD 9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

26.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- 26.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 26.02 Describe the effect of money management on personal and career goals. FL 3.0
- 26.03 Develop a personal budget and financial goals. FL3.1
- 26.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 26.05 Maintain financial records. FL3.3
- 26.06 Read and reconcile financial statements. FL3.4
- 26.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Commercial Fishing 1  
**Course Number:** 8751210  
**Course Credit:** 1

**Course Description:**

This course provides instruction in docking, starting, and operating a vessel at sea.

01.0 Unlock and get vessel underway--The student will be able to:

- 01.01 Bleed air compressor of water.
- 01.02 Check and maintain batteries.
- 01.03 Measure fuel in day tank.
- 01.04 Maintain proper level of coolant in expansion tank.
- 01.05 Determine if all navigation lights are functioning.
- 01.06 Tighten engine mounts.
- 01.07 Inspect water level indicators for cleanliness.
- 01.08 Test marine radio equipment.
- 01.09 Inspect antenna for physical damage.
- 01.10 Determine if hydraulic steering equipment is free of air and water.
- 01.11 Inspect fire-fighting equipment for excessive wear, proper location, and prescribed type.
- 01.12 Inspect buoyant apparatus for excessive wear, proper location and prescribed type.
- 01.13 Determine that rudder-stuffing box is functioning properly.
- 01.14 Tighten propeller stuffing box.
- 01.15 Inspect vessel for fuel leakage.
- 01.16 Prepare list of equipment to be checked for oil leakage.
- 01.17 Determine if proper voltage is being generated.
- 01.18 Maneuver vessel from berth into navigable waterway.
- 01.19 Pump out bilges.
- 01.20 Secure loose deck equipment.
- 01.21 Secure watertight doors, hatches, vents and skylights.

02.0 Dock a vessel--The student will be able to:

- 02.01 Assign crewmembers positions for mooring vessel.
- 02.02 Cast off vessel's mooring lines while remaining on dock.
- 02.03 Cast off vessel's mooring lines while remaining aboard vessel.
- 02.04 Tie various knots used in maritime operations.
- 02.05 Maneuver vessel to dock.
- 02.06 Release towing gear aboard towing vessel and barges.
- 02.07 Secure mooring lines to dock.
- 02.08 Secure mooring lines to vessel.
- 02.09 Secure engine room.
- 02.10 Secure propeller shaft.
- 02.11 Inspect engine room equipment for proper maintenance and safety.



- 02.12 Correct nautical chart prior to departure.
  - 02.13 Prepare vessel to take on fuel and lube oil.
  - 02.14 Prepare to take on water aboard vessel.
  - 02.15 Splice eye into line.
- 03.0 Operate vessel at sea--The student will be able to:
- 03.01 Act as vessel's lookout.
  - 03.02 Determine if electrical connections and outlets are tight and dry.
  - 03.03 Determine if electrical outlets have proper voltage.
  - 03.04 Change air filters on engines.
  - 03.05 Change oil and fuel filters on engines.
  - 03.06 Change oil in engines.
  - 03.07 Demonstrate knowledge of the rules of the road in operating a vessel.
  - 03.08 Determine time of arrival when current effect is known.
  - 03.09 Determine time of arrival when current effect is unknown.
  - 03.10 Display day or night signals for different towing situations.
  - 03.11 Inspect heaving lines, mooring lines, and fixed and running rigging for excessive wear.
  - 03.12 Clean engine room and its equipment.
  - 03.13 Determine Greenwich Mean Time (GMT) by using vessel's chronometer.
  - 03.14 Determine position by using Omega navigation system or equipment.
  - 03.15 Steer a course by using the magnetic compass.
  - 03.16 Operate radar equipment.
  - 03.17 Interpret basic meteorological data.
  - 03.18 Determine "distance off" by using angular measurements.
  - 03.19 Establish a vessel's dead reckoning (DR) track.
  - 03.20 Determine position by means of celestial navigation.
  - 03.21 Plot position by using Loran and Loran overprint charts.
  - 03.22 Set sea watches.
  - 03.23 Chip and paint vessel.
- 08.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 08.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 08.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 08.03 Construct charts/tables/graphs using functions and data. AF3.5
- 09.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 09.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 09.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 10.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 10.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0

- 10.02 Locate, organize and reference written information from various sources. CM 3.0
- 10.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 10.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 10.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 10.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 10.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Commercial Fishing 2  
**Course Number:** 8751220  
**Course Credit:** 1

**Course Description:**

This course includes instruction in maneuvering, anchoring and handling cargo.

04.0 Maneuver around offshore structures--The student will be able to:

- 04.01 Assist personnel in boarding personnel basket.
- 04.02 Maneuver vessel to discharge passengers.
- 04.03 Maneuver vessel to discharge cargo.
- 04.04 Secure hoses on board vessel.
- 04.05 Secure lashings, hawser, or mooring lines on board vessel.

05.0 Anchor vessel--The student will be able to:

- 05.01 Anchor vessel.
- 05.02 Maneuver vessel to anchorage area.
- 05.03 Anchor vessel by using anchor winch.
- 05.04 Anchor vessel by using anchor windlass.
- 05.05 Stack (tier) anchor chain in chain locker.

06.0 Manage and perform cargo handling duties--The student will be able to:

- 06.01 Adjust vessel's mooring lines to allow for variations of tides and current.
- 06.02 Determine if all cargo is aboard.
- 06.03 Determine if all deck cargo is secured.
- 06.04 Determine if vessel is loaded in compliance with stability laws.
- 06.05 Discharge cargo by using bulk cargo system.
- 06.06 Load cargo by using bulk cargo system.
- 06.07 Prepare list of lost or damaged cargo.

07.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0

- 07.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 07.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 07.03 Present information formally and informally for specific purposes and audiences. AF2.9

11.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

- 11.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS.1.0
- 11.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS.2.0

- 11.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 11.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
  - 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 12.02 Explain emergency procedures to follow in response to workplace accidents.
  - 12.03 Create a disaster and/or emergency response plan. SHE 2.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Commercial Fishing 3  
**Course Number:** 8751230  
**Course Credit:** 1

**Course Description:**

This course includes instruction in shrimping, net fishing, pot fishing, and line fishing.

13.0 Perform shrimp boat deckhand duties--The student will be able to:

- 13.01 Stand lookout, steering, and engine room watches.
- 13.02 Attach nets, slings, hooks, and other lifting devices to cables, booms, and hoists.
- 13.03 Load equipment and supplies aboard vessel by hand or using hoisting equipment.
- 13.04 Signal other workers to move, hoist, and position loads.
- 13.05 Row boats and dinghies and operate skiffs to transport fishers, and to tow and position nets.
- 13.06 Attach accessories, such as floats, weights, and markers to nets and lines.
- 13.07 Pull and guide nets and lines onto vessel.
- 13.08 Remove shrimp from nets.
- 13.09 Sort and clean marine life and return undesirable and illegal catch to the sea.
- 13.10 Operate brine tank and refrigeration equipment.
- 13.11 Place catch in containers and store in hold and cover with salt and ice.
- 13.12 Wash decks, conveyors, knives, and other equipment, using brush, detergent, and water.
- 13.13 Lubricate, adjust, and make minor repairs to engines and equipment.

14.0 Perform net fisher duties--The student will be able to:

- 14.01 Catch finfish, shellfish, and other marine life alone or as crew.
- 14.02 Use and operate equipment such as dip, diver, gill, hoop, lampara, pound, trap, reef, trammel, and travel nets.
- 14.03 Use and operate equipment such as purse seine, haul, drag, or beach seine.
- 14.04 Insert and attach hoops, rods, poles, ropes, floats, weights, beam runners, other boards, and cables to form, reinforce, position, set tow and anchor net.
- 14.05 Attach flags and lights to buoys to identify net location.
- 14.06 Put net into water and anchor or tow net according to kind of net used, location of fishing area, and method of fishing.
- 14.07 Haul net to boat or shore manually and using winch.
- 14.08 Empty catch from net, using dip net, brail bucket, hydraulic pump, and conveyor, and by lifting net, using block and tackle, and dumping catch.
- 14.09 Store catch in hold and containers, or transfer catch to base ship or bigger boat.
- 14.10 Ride in skiff and hold end of net as base ship discharges net to surround school of fish or other seafood.
- 14.11 Sort and clean fish.
- 14.12 Repair fishing nets and gear.
- 14.13 Act as lookout or observe instruments to sight schools of fish.

- 15.0 Perform pot fisher duties--The student will be able to:
- 15.01 Fish for marine life, including crab, eel, or lobster, using pots (cages with funnel-shaped net openings).
  - 15.02 Tie marker float to line, attach line to pot, fasten bait inside pot, and lower pot into water.
  - 15.03 Hook marker float with pole and pull up pot.
  - 15.04 Reach through hinged door of pot to remove catch or dump catch on deck.
  - 15.05 Measure catch with fixed gauge to insure compliance with legal size.
  - 15.06 Place legal catch in container and toss illegal catch overboard.
  - 15.07 Place peg in hinge of claws to prevent lobsters in container from killing each other.
  - 15.08 Rig and lower dredge (rake scoop with bag net attached), drag dredge behind boat to gather marine life from water bottom, and hoist it to deck by hand using block and tackle.
- 16.0 Perform line fisher duties--The student will be able to:
- 16.01 Catch fish and other marine life with hooks and lines, working alone or as a member of crew.
  - 16.02 Lay out line and attach hooks, bait, sinkers, and various anchors, floats, and swivels, depending on quarry sought.
  - 16.03 Put line into water, and hold, anchor, or troll (tow) line to catch fish.
  - 16.04 Haul line onto boat deck by hand, reel, or synch, and remove catch.
  - 16.05 Store catch in hold or boxes and pack catch in ice.
  - 16.06 Hit fish with club to stun it before removing it from hook.
  - 16.07 Use gaff to assist in hauling fish from water.
  - 16.08 Slit fish, remove viscera, and wash cavity to clean fish for storage.
  - 16.09 Steer vessel in fishing area.
- 21.0 Use information technology tools. -- The students will be able to:
- 21.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 21.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 21.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 21.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 24.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 24.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 24.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 24.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 24.04 Interpret and explain written organizational policies and procedures. ELR 2.0

26.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- |       |  |        |
|-------|--|--------|
| 26.01 | Identify and describe the services and legal responsibilities of financial institutions. | FL 2.0 |
| 26.02 | Describe the effect of money management on personal and career goals.                    | FL 3.0 |
| 26.03 | Develop a personal budget and financial goals.   | FL3.1  |
| 26.04 | Complete financial instruments for making deposits and withdrawals.                      | FL3.2  |
| 26.05 | Maintain financial records.  | FL3.3  |
| 26.06 | Read and reconcile financial statements.   | FL3.4  |
| 26.07 | Research, compare and contrast investment opportunities.                                 |        |

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Commercial Fishing 4  
**Course Number:** 8751240  
**Course Credit:** 1

**Course Description:**

This course includes instruction in bringing a vessel into port and performing maintenance duties.

17.0 Bring vessel into port--The student will be able to:

- 17.01 Determine approximate position and hazardous conditions by using fathometer.
- 17.02 Determine position by using radio direction finder (RDF).
- 17.03 Determine vessel's course and position against dead reckoning plots.

18.0 Perform crew operational and maintenance duties aboard vessel in port--The student will be able to:

- 18.01 Arrange for dry-docking a vessel.
- 18.02 Change brushes in auxiliary engines.
- 18.03 Change lube oil filters on auxiliary engines.
- 18.04 Change fuel filters on auxiliary engines.
- 18.05 Clean electric motor.
- 18.06 Prepare list of hoses, valves, connections, gaskets, and tanks needing repairs.
- 18.07 Determine if const-a-voltage regulator is functioning properly.
- 18.08 Determine if drive bolts on air compressors are excessively loose.
- 18.09 Tighten panel box fittings to prevent vibration.
- 18.10 Clean keel cool strainers.
- 18.11 Clean oil coolers.
- 18.12 Clean oil strainers in marine gears.
- 18.13 Drain water out of fuel traps.
- 18.14 Tighten fuel and oil line connections on engines.
- 18.15 Inspect day tanks containing fuel for leaks.
- 18.16 Lubricate deck and engine room equipment on a regular schedule.
- 18.17 Determine vessel's manning requirements.
- 18.18 Wash down vessel's superstructure and decks.

22.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 22.01 Describe the nature and types of business organizations. SY 1.0
- 22.02 Explain the effect of key organizational systems on performance and quality.
- 22.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 22.04 Explain the impact of the global economy on business organizations.



23.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 23.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 23.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 23.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 23.04 Employ mentoring skills to inspire and teach others. LT 5.0

25.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 25.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 25.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 25.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 25.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 25.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 25.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 25.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 25.08 Research the benefits of ongoing professional development. ECD 9.0
- 25.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Commercial Fishing 5  
**Course Number:** 8751250  
**Course Credit:** 1

**Course Description:**

This course includes instruction in meal preparation, emergency procedures, and employability skills.

13.0 Prepare meals aboard vessel--The student will be able to:

- 13.01 Make yeast breads.
- 13.02 Make pie crust.
- 13.03 Make cream filling in pie.
- 13.04 Make pancakes.
- 13.05 Make corn bread.
- 13.06 Make cakes.
- 13.07 Make biscuits.
- 13.08 Clean galley deck, woodwork, and cabinets.
- 13.09 Wash dishes, glasses, flatware, trays, pots and pans.
- 13.10 Cook vegetables by boiling, simmering and steaming.
- 13.11 Cook meats, seafood, and fowl by frying.
- 13.12 Cook meats, seafood, and fowl by stewing and braising.
- 13.13 Cook meats, seafood, and fowl by broiling.
- 13.14 Cook meats, seafood, and fowl by roasting or baking.
- 13.15 Cook meats, seafood, and fowl by braising.
- 13.16 Season and bread meats, seafood, and fowl for baking, roasting, broiling and frying.
- 13.17 Cook eggs by frying and scrambling.
- 13.18 Make gravies.
- 13.19 Make coffee.
- 13.20 Make salads.
- 13.21 Prepare soup stock.
- 13.22 Prepare sandwiches.
- 13.23 Prepare dehydrated or concentrated foods.
- 13.24 Make soup with stock, meats, vegetables, and seasonings, as required by recipe.
- 13.25 Carve cooled meats.
- 13.26 Cut, trim, and bone beef, lamb, pork, or fish into prescribed portions for steaks, chops, and fillets.
- 13.27 Clean and care for equipment.
- 13.28 Order food.
- 13.29 Plan menu.
- 13.30 Keep records for purchasing foods.
- 13.31 Store food.
- 13.32 Keep continuous inventory of food items.

14.0 Plan and perform emergency procedures--The student will be able to:

- 14.01 Act as lookout to keep person in sight who has been lost overboard.
  - 14.02 Administer first aid to prevent shock.
  - 14.03 Administer first aid to control bleeding.
  - 14.04 Administer CPR
  - 14.05 Launch lifeboat and life raft.
  - 14.06 Close emergency fuel shutoff valves.
  - 14.07 Extinguish class A, B, and C type fires.
  - 14.08 Maneuver life raft or lifeboat away from vessel.
  - 14.09 Maneuver vessel to return to area in which person was lost overboard.
  - 14.10 Issue life preservers for use by passengers and crew.
  - 14.11 Secure engine room to prevent spread of fire.
  - 14.12 Send out distress signals.
  - 14.13 Sound abandon-ship alarm.
  - 14.14 Train crew to perform emergency procedures.
- 15.0 Demonstrate appropriate communication skills--The student will be able to:
- 15.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 15.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 15.03 Read and follow written and oral instructions.
  - 15.04 Answer and ask questions coherently and concisely.
  - 15.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 15.06 Demonstrate appropriate telephone/communication skills.
- 16.0 Demonstrate appropriate math skills--The student will be able to:
- 16.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 16.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 16.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 16.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 16.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 17.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 17.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 17.02 Draw conclusions or make inferences from data.
  - 17.03 Identify health-related problems that may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 17.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

18.0 Demonstrate employability skills--The student will be able to:

- 18.01 Conduct a job search.
- 18.02 Secure information about a job.
- 18.03 Identify documents that may be required when applying for a job interview.
- 18.04 Complete a job application form correctly.
- 18.05 Demonstrate competence in job interview techniques.
- 18.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
- 18.07 Identify acceptable work habits.
- 18.08 Demonstrate knowledge of how to make appropriate job changes.
- 18.09 Demonstrate acceptable employee health habits.
- 18.10 Demonstrate knowledge of the "Florida Right-To-Know Law" as recorded in Florida Statutes Chapter 442.

19.0 Demonstrate an understanding of entrepreneurship--The student will be able to:

- 19.01 Define entrepreneurship.
- 19.02 Describe the importance of entrepreneurship to the American economy.
- 19.03 List the advantages and disadvantages of business ownership.
- 19.04 Identify the risks involved in ownership of a business.
- 19.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 19.06 Identify the business skills needed to operate a small business efficiently and effectively.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Gasoline Engine Service Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>Secondary</b>	<b>PSAV</b>
Program Number	8766000	I470606
CIP Number	0647.060600	0647.060600
Grade Level	9-12, 30, 31	30,31
Standard Length	8 Credits	1200 hours
Teacher Certification	GASENG RPR @7G	GASENG RPR @7G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3053	49-3053
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 8.0 Language: 8.0 Reading: 8.0

### **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 purpose of this program is to prepare students for employment or advanced training in the gasoline engine service technology industry and for a career as a small gas engine mechanic (SOC 49-3053).

The content includes but is not limited to all aspects of the gasoline engine services technology industry, and demonstrates such elements of the industry as planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

### Program Structure

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

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	SER0001	Service Technician	100	49-3053
B	SER0700	Clerk Parts	100	49-3053
C	SER0171	Installer Repairer	200	49-3053
D	SER0341	Helper, Mechanic and Repairer	150	49-3053
	SER0161	Small Engine Mechanic 1	325	49-3053
E	SER0162	Small Engine Mechanic 2	325	49-3053

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8766010	Gasoline Engine Service 1	1 credit	49-3053	2
B	8766020	Gasoline Engine Service 2	1 credit	49-3053	2
C	8766030	Gasoline Engine Service 3	1 credit	49-3053	2
	8766040	Gasoline Engine Service 4	1 credit	49-3053	2
	8766050	Gasoline Engine Service 5	1 credit	49-3053	2
	8766060	Gasoline Engine Service 6	1 credit	49-3053	2
D	8766070	Gasoline Engine Service 7	1 credit	49-3053	2
E	8766080	Gasoline Engine Service 8	1 credit	49-3053	2

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

#### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 8.0, Language 8.0, and Reading 8.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Apply personal and industry safety requirements.
- 02.0 Demonstrate the proper use and care of basic shop tools and equipment.



- 03.0 Demonstrate appropriate set-up procedures.
- 04.0 Demonstrate proficiency in performing pre-delivery maintenance services.
- 05.0 Demonstrate mathematics knowledge and skills.
- 06.0 Demonstrate science knowledge and skills
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 08.0 Demonstrate industry-related math skills.
- 09.0 Demonstrate proficiency in acceptable employee behavior.
- 10.0 Demonstrate proficiency in parts inventory identification and repair order processing.
- 11.0 Demonstrate language arts knowledge and skills
- 12.0 Solve problems using critical thinking skills, creativity and innovation.
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 14.0 Perform basic fuel system services.
- 15.0 Perform basic engine service and minor repairs.
- 16.0 Perform basic power transfer system and engine controls adjustments.
- 17.0 Use information technology tools
- 18.0 Describe the importance of professional ethics and legal responsibilities.
- 19.0 Demonstrate personal money-management concepts, procedures, and strategies
- 20.0 Perform power transfer system service.
- 21.0 Service and repair lubrication systems.
- 22.0 Perform basic electrical system service.
- 23.0 Service and repair cooling and exhaust systems.
- 24.0 Diagnose, repair and recondition basic engine components.
- 25.0 Apply industry-related science to small gas engine service.
- 26.0 Service and repair starting systems.
- 27.0 Perform basic tune-up service.
- 28.0 Diagnose and repair ignition systems.
- 29.0 Service, repair and adjust engine controls.
- 30.0 Diagnose service and repair electrical systems.
- 31.0 Demonstrate proficiency in repairing and maintaining basic two-stroke cycle engines.
- 32.0 Demonstrate proficiency in repairing and maintaining basic four-stroke cycle engines.
- 33.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 34.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 35.0 Explain the importance of employability and entrepreneurship skills
- 36.0 Demonstrate proficiency in repairing engine interior components.
- 37.0 Demonstrate proficiency in diagnosing and repairing power transfer systems.
- 38.0 Demonstrate applied communications skills.
- 39.0 Demonstrate proficiency in servicing, repairing and adjusting specific types of engines.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Gasoline Engine Service Technology**  
**PSAV Number: I470606**

**Course Number: SER0001**  
**Occupational Completion Point: A**  
**Service Technician – 100 Hours – SOC Code 49-3053**

- 01.0 Identify personal and industry safety requirements--The student will be able to:
- 01.01 Identify federal and state standards for health and safety, including OSHA and the "Right-to-Know" law, as recorded in (29 CFR-1910.1200)
  - 01.02 Identify safety requirements for shop organization and management.
  - 01.03 Identify safety requirements for the use of industry tools and equipment.
  - 01.04 Identify fire-safety precautions.
  - 01.05 Identify electrical-safety procedures.
- 02.0 Demonstrate the proper use and care of basic shop tools and equipment--The student will be able to:
- 02.01 Identify general and specialized hand tools.
  - 02.02 Identify and use power tools.
  - 02.03 Identify and use fasteners.
- 03.0 Demonstrate appropriate set-up procedures--The student will be able to:
- 03.01 Identify and interpret manufacturer's identification number information.
  - 03.02 Inspect tires; check and adjust air pressure.
  - 03.03 Check for proper fluid levels.
  - 03.04 Check accessory circuits.
  - 03.05 Inspect and fill battery.
  - 03.06 Detail engine and unit for delivery.
  - 03.07 Install cables, hoses and electrical assemblies.
  - 03.08 Inspect cables, connectors, clamps and hold-downs; adjust as necessary.
  - 03.09 Check drive chain tension.
- 04.0 Demonstrate proficiency in performing pre-delivery maintenance services--The student will be able to:
- 04.01 Identify and describe typical gasoline engine lubricants and lubricant properties.
  - 04.02 Perform battery state-of-charge test; perform slow/fast battery charge.
  - 04.03 Inspect battery cables, connectors, clamps and hold-downs; adjust/tighten as needed.
  - 04.04 Inspect fuses and replace as needed.
  - 04.05 Check radiator coolant level (if applicable), test and add coolant.
  - 04.06 Check fluid levels and change fluids and filters.
- 05.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 06.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 06.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 07.02 Locate, organize and reference written information from various sources. CM 3.0
- 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 07.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 07.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: SER0700****Occupational Completion Point: B****Clerk Parts – 100 Hours – SOC Code 49-3053**

- 08.0 Demonstrate industry-related math skills--The student will be able to:
- 08.01 Measure tolerance(s) millimeters and inches.
- 08.02 Perform metric to SAE (and SAE to metric) conversions.
- 09.0 Demonstrate proficiency in acceptable employee behavior--The student will be able to:
- 09.01 Explain the effects of chemical/substance abuse.
- 09.02 Identify principles of stress management.
- 09.03 Identify and define career opportunities in the industry.
- 09.04 Explain and identify acceptable work ethics.
- 09.05 Explain acceptable dress standards.
- 09.06 Identify and demonstrate proper customer relations skills.
- 09.07 Identify principles of time management.
- 09.08 Identify and define payroll deductions (taxes, insurance, social security) and employee benefits.
- 10.0 Demonstrate proficiency in parts inventory identification and repair order processing--The student will be able to:

- 10.01 Read and interpret information in parts and service manuals and other technical media.
- 10.02 Read and understand graphs, charts, diagrams and tables commonly used in the industry.
- 10.03 Write and process work orders.
- 10.04 Prepare cost estimates for jobs using service- and flat-rate standards.
- 10.05 Perform basic parts inventory tracking.
- 10.06 Interpret and verify complaint; determine needed repairs.
  
- 11.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
  - 11.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 11.03 Present information formally and informally for specific purposes and audiences. AF2.9
  
- 12.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
  - 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 12.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
  
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
  - 13.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 13.02 Explain emergency procedures to follow in response to workplace accidents.
  - 13.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: SER0171**  
**Occupational Completion Point: C**  
**Installer Repairer – 200 Hours – SOC Code 49-3053**

- 14.0 Perform basic fuel system service--The student will be able to:
  - 14.01 Service air filters.
  - 14.02 Service or replace fuel filters.
  - 14.03 Determine and use correct fuel and fuel mixtures.
  
- 15.0 Perform basic engine service and minor repairs--The student will be able to:
  - 15.01 Identify types of engines.
  - 15.02 Identify engine assemblies and systems.
  - 15.03 Service crankcase breathers.

- 15.04 Identify types and ratios of two-cycle mix oils and their application to specific types of equipment.
- 15.05 Install spark plug(s).
- 15.06 Inspect and test fusible links, circuit breakers and fuses; replace as needed.
- 16.0 Perform basic power transfer system and engine controls adjustments--The student will be able to:
- 16.01 Inspect and measure drive belts and chains.
- 16.02 Install drive belts and chains.
- 16.03 Identify power transfer system components.
- 16.04 Sharpen and balance blades.
- 16.05 Remove and replace or install blades correctly.
- 17.0 Use information technology tools. -- The students will be able to:
- 17.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 17.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 17.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 18.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 18.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 18.02 Evaluate alternative responses to workplace situations based on personal, 18.02.1 professional, ethical, legal responsibilities, and employer policies. ELR 1.1
- 18.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR 1.2
- 18.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 19.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 19.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 19.02 Describe the effect of money management on personal and career goals. FL 3.0
- 19.03 Develop a personal budget and financial goals. FL 3.1
- 19.04 Complete financial instruments for making deposits and withdrawals. FL 3.2
- 19.05 Maintain financial records. FL 3.3
- 19.06 Read and reconcile financial statements. FL 3.4
- 19.07 Research, compare and contrast investment opportunities.

**Course Number: SER0341**

**Occupational Completion Point: D**

**Helper, Mechanic and Repairer – 150 Hours – SOC Code 49-3053**

- 20.0 Perform power transfer system service--The student will be able to:
  - 20.01 Replace drive components.
  - 20.02 Remove and repair clutches.
  
- 21.0 Service and repair lubrication systems--The student will be able to:
  - 21.01 Replace seals and gaskets.
  - 21.02 Identify lubrication systems.
  - 21.03 Service and repair lubrication systems.
  
- 22.0 Perform basic electrical system service--The student will be able to:
  - 22.01 Identify ignition systems and components.
  - 22.02 Perform basic electrical tests.
  - 22.03 Replace electrical system components.
  - 22.04 Identify and test batteries.
  - 22.05 Service batteries according to manufacturer's specifications.
  
- 23.0 Service and repair cooling and exhaust systems--The student will be able to:
  - 23.01 Service air cooling fins and screens.
  - 23.02 Service two-cycle exhaust systems.
  - 23.03 Service four-cycle exhaust systems.
  
- 24.0 Repair and recondition basic engine components--The student will be able to:
  - 24.01 Identify types of internal combustion engines.
  - 24.02 Explain the basic principles of the operation of types of internal combustion engines.
  - 24.03 Locate engine serial and model numbers.
  - 24.04 Identify engine assemblies and systems.
  - 24.05 Disassemble engines.
  - 24.06 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
  
- 25.0 Apply industry-related science to small gas engine service--The student will be able to:
  - 25.01 Explain how temperature extremes, chemical reactions, and moisture content affect mechanical systems.
  - 25.02 Draw conclusions or make inferences from data.
  - 25.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
  - 25.04 Measure pressure in terms of pounds per square inch (PSI).
  
- 26.0 Service and repair starting systems--The student will be able to:
  - 26.01 Service and repair manual starting systems.
  - 26.02 Service and repair electrical starting systems.
  - 26.03 Test and service battery starting systems.

- 27.0 Perform basic tune-up service--The student will be able to:
- 27.01 Drain and refill oil, if applicable.
  - 27.02 Identify spark plugs and special applications.
  - 27.03 Remove, adjust and replace spark plugs.
  - 27.04 Service filters and breathers.
  - 27.05 Adjust ignition systems timing.
  - 27.06 Inspect and service power transfer system.
  - 27.07 Adjust valves.
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 28.01 Describe the nature and types of business organizations. SY 1.0
  - 28.02 Explain the effect of key organizational systems on performance and quality.
  - 28.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 28.04 Explain the impact of the global economy on business organizations.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 29.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 29.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 30.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 30.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 30.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 30.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 30.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 30.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 30.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 30.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 30.08 Research the benefits of ongoing professional development. ECD 9.0
  - 30.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: SER0161**  
**Small Engine Mechanic (1 of 2) – 325 Hours – SOC Code 49-3053**

- 31.0 Diagnose and repair ignition systems--The student will be able to:
- 31.01 Identify and diagnose ignition systems and components.
  - 31.02 Repair magneto ignition systems.
  - 31.03 Repair solid-state ignition systems.
  - 31.04 Repair battery ignition systems.

- 31.05 Repair impulse ignition systems.
  - 31.06 Diagnose magneto ignition systems.
  - 31.07 Diagnose solid-state ignition systems.
  - 31.08 Diagnose battery ignition systems.
  - 31.09 Diagnose impulse ignition systems.
- 32.0 Service, repair and adjust engine controls--The student will be able to:
- 32.01 Service, repair and adjust governor speed controls.
  - 32.02 Service, repair and adjust remote speed controls.
  - 32.03 Service, repair and adjust manual start-stop controls.
  - 32.04 Service, repair and adjust electrical start-stop controls.
  - 32.05 Service, repair and adjust zone systems.
  - 32.06 Service, repair and adjust blade clutch controls.
  - 32.07 Service, repair and adjust chain brake systems.
  - 32.08 Comply with the Consumer Protection Act (CPA) for three-second stops.
  - 32.09 Comply with the CPA for interlocks.
  - 32.10 Comply with the CPA for blade tip speed.
  - 32.11 Read and interpret CPA rules and regulations.
- 33.0 Diagnose, service, repair and adjust electrical systems--The student will be able to:
- 33.01 Operate electrical testing instruments.
  - 33.02 Perform electrical system tests.
  - 33.03 Replace electrical system components.
  - 33.04 Diagnose electrical system components.
  - 33.05 Service, repair and adjust charging systems.
- 34.0 Demonstrate proficiency in repairing and maintaining basic two-stroke cycle engines--  
The student will be able to:
- 34.01 Remove, clean and inspect piston rods and assemblies.
  - 34.02 Measure out-of-round piston and cylinder.
  - 34.03 Check the total bearing surface of connecting rod bearings.
  - 34.04 Measure piston skirts and ring grooves.
  - 34.05 Measure the piston ring gap in the cylinder bore.
  - 34.06 Install piston pins according to manufacturer's specifications.
  - 34.07 Check rod and piston assembly alignment.
  - 34.08 Install rings on pistons.
  - 34.09 Install piston rod assemblies.
  - 34.10 Check needle bearings.
  - 34.11 Inspect crankshafts and install seals.
  - 34.12 Inspect, clean and/or replace reed valves.
  - 34.13 Reassemble engines.
  - 34.14 Diagnose head problems by use of the visual inspection method.
  - 34.15 Diagnose head problems by use of the compression tester method.
  - 34.16 Diagnose head problems by use of the cylinder air pressure method.
  - 34.17 Measure and check crankshafts with a micrometer to diagnose engine problems.
- 35.0 Demonstrate proficiency in repairing and maintaining basic four-stroke cycle engines--  
The student will be able to:



- 35.01 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 35.02 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 35.03 Grind valve seats and reface valves.
- 35.04 Check and inspect springs for free height, distortion and installed height.
- 35.05 Adjust valve lash.
- 35.06 Remove and inspect camshafts and lifters.
- 35.07 Measure camshafts.
- 35.08 Service camshaft bearings.
- 35.09 Clean and inspect lifters for wear.
- 35.10 Time valve drive assemblies.
- 35.11 Remove piston from rods assemblies.
- 35.12 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 35.13 Check piston pins and bosses for wear.
- 35.14 Measure piston ring lands width, out-of-round and taper.
- 35.15 Measure the piston ring gap in the cylinder bore.
- 35.16 Install and fit piston pins.
- 35.17 Check rod and piston assembly alignment.
- 35.18 Remove and replace rod bearings.
- 35.19 Hone and clean cylinders.
- 35.20 Install rings on pistons.
- 35.21 Measure and check crankshafts with a micrometer.
- 35.22 Check for end play.
- 35.23 Check the bearing bore with a telescoping gage using special tools provided by the engine manufacturer.
- 35.24 Reassemble engines.
- 35.25 Install oil seals.
- 35.26 Diagnose valve and head problems by use of the visual inspection method, i.e., water contamination vs. fuel-rich or lean carburetor adjustment.
- 35.27 Diagnose valve and head problems by use of the compression tester method.
- 35.28 Diagnose valve and head problems by use of the cylinder air pressure method.
- 35.29 Diagnose valve and head problems by use of the stethoscope method.

**Course Number: SER0162**

**Occupational Completion Point: E**

**Small Engine Mechanic (2 of 2) – 325 Hours – SOC Code 49-3053**

36.0 Demonstrate proficiency in repairing engine interior components--The student will be able to:

- 36.01 Service, repair and adjust valve systems.
- 36.02 Service, repair and adjust rings, bores and pistons.
- 36.03 Service, repair and adjust crankshafts and bearings.
- 36.04 Service, repair and adjust rods.
- 36.05 Service, repair and adjust lubrication systems.
- 36.06 Service, repair and adjust internal governor.
- 36.07 Service, repair and adjust internal components timing.
- 36.08 Assemble complete engines to manufacturer's specifications.
- 36.09 Diagnose causes of component failures to determine if they are due to friction, resulting from poor lubrication or contaminated fuel or to normal wear.

- 37.0 Demonstrate proficiency in diagnosing and repairing power transfer systems--The student will be able to:
- 37.01 Repair manual transmissions.
  - 37.02 Repair differentials.
  - 37.03 Identify power transfer system components.
  - 37.04 Replace drive components.
  - 37.05 Remove and replace hydraulic pump systems.
  - 37.06 Diagnose manual transmissions.
  - 37.07 Diagnose differentials.
  - 37.08 Diagnose drive components.
- 38.0 Demonstrate applied communication skills--The student will be able to:
- 38.01 Draw and interpret electrical, electronic, hydraulic and mechanical schematics.
  - 38.02 Write reports.
  - 38.03 Maintain test logs.
  - 38.04 Make equipment failure reports.
  - 38.05 Specify and requisition components.
  - 38.06 Compose technical letters
  - 38.07 Write formal reports of laboratory experiences.
- 39.0 Demonstrate proficiency in servicing, repairing and adjusting specific types of engines--The student will be able to:
- 39.01 Service, repair and adjust lawn and garden equipment.
  - 39.02 Service, repair and adjust commercial golf course equipment.
  - 39.03 Service, repair and adjust commercial industrial equipment.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 1  
**Course Number:** 8766010  
**Course Credit:** 1

**Course Description:**

01.0 Identify personal and industry safety requirements--The student will be able to:

- 01.01 Identify federal and state standards for health and safety, including OSHA and the "Right-to-Know" law, as recorded in (29 CFR-1910.1200).
- 01.02 Identify safety requirements for shop organization and management.
- 01.03 Identify safety requirements for the use of industry tools and equipment.
- 01.04 Identify fire-safety precautions.
- 01.05 Identify electrical-safety procedures.

02.0 Demonstrate the proper use and care of basic shop tools and equipment--The student will be able to:

- 02.01 Identify general and specialized hand tools.
- 02.02 Identify and use power tools.
- 02.03 Identify and use fasteners.

03.0 Demonstrate appropriate set-up procedures--The student will be able to:

- 03.01 Identify and interpret manufacturer's identification number information.
- 03.02 Inspect tires; check and adjust air pressure.
- 03.03 Check for proper fluid levels.
- 03.04 Check accessory circuits.
- 03.05 Inspect and fill battery.
- 03.06 Detail engine and unit for delivery.
- 03.07 Install cables, hoses and electrical assemblies.
- 03.08 Inspect cables, connectors, clamps and hold-downs; adjust as necessary.
- 03.09 Check drive chain tension.

04.0 Demonstrate proficiency in performing pre-delivery maintenance services--The student will be able to:

- 04.01 Identify and describe typical gasoline engine lubricants and lubricant properties.
- 04.02 Perform battery state-of-charge test; perform slow/fast battery charge.
- 04.03 Inspect battery cables, connectors, clamps and hold-downs; adjust/tighten as needed.
- 04.04 Inspect fuses and replace as needed.
- 04.05 Check radiator coolant level (if applicable), test and add coolant.
- 04.06 Check fluid levels and change fluids and filters.

05.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

- 05.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 05.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 05.03 Construct charts/tables/graphs using functions and data. AF3.5
- 06.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
  - 06.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 06.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 07.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
  - 07.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 07.02 Locate, organize and reference written information from various sources. CM 3.0
  - 07.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 07.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 07.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 07.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 07.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 2  
**Course Number:** 8766020  
**Course Credit:** 1

**Course Description:**

- 08.0 Demonstrate industry-related math skills--The student will be able to:
- 08.01 Measure tolerance(s) millimeters and inches.
  - 08.02 Perform metric to SAE (and SAE to metric) conversions.
- 09.0 Demonstrate proficiency in acceptable employee behavior--The student will be able to:
- 09.01 Explain the effects of chemical/substance abuse.
  - 09.02 Identify principles of stress management.
  - 09.03 Identify and define career opportunities in the industry.
  - 09.04 Explain and identify acceptable work ethics.
  - 09.05 Explain acceptable dress standards.
  - 09.06 Identify and demonstrate proper customer relations skills.
  - 09.07 Identify principles of time management.
  - 09.08 Identify and define payroll deductions (taxes, insurance, social security) and employee benefits.
- 10.0 Demonstrate proficiency in parts inventory identification and repair order processing--  
The student will be able to:
- 10.01 Read and interpret information in parts and service manuals and other technical media.
  - 10.02 Read and understand graphs, charts, diagrams and tables commonly used in the industry.
  - 10.03 Write and process work orders.
  - 10.04 Prepare cost estimates for jobs using service- and flat-rate standards.
  - 10.05 Perform basic parts inventory tracking.
  - 10.06 Interpret and verify complaint; determine needed repairs.
- 11.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 11.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 11.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 11.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 12.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

- 12.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 12.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 12.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 12.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 13.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 13.02 Explain emergency procedures to follow in response to workplace accidents.
  - 13.03 Create a disaster and/or emergency response plan. SHE 2.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 3  
**Course Number:** 8766030  
**Course Credit:** 1

**Course Description:**

- 14.0 Perform basic fuel system service--The student will be able to:
- 14.01 Service air filters.
  - 14.02 Service or replace fuel filters.
  - 14.03 Determine and use correct fuel and fuel mixtures.
- 15.0 Perform basic engine service and minor repairs--The student will be able to:
- 15.01 Identify types of engines.
  - 15.02 Identify engine assemblies and systems.
  - 15.03 Service crankcase breathers.
  - 15.04 Identify types and ratios of two-cycle mix oils and their application to specific types of equipment.
  - 15.05 Install spark plug(s).
  - 15.06 Inspect and test fusible links, circuit breakers and fuses; replace as needed.
- 16.0 Perform basic power transfer system and engine controls adjustments--The student will be able to:
- 16.01 Inspect and measure drive belts and chains.
  - 16.02 Install drive belts and chains.
  - 16.03 Identify power transfer system components.
  - 16.04 Sharpen and balance blades.
  - 16.05 Remove and replace or install blades correctly.
- 17.0 Use information technology tools. -- The students will be able to:
- 17.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 17.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 17.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 18.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 18.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 18.02 Evaluate alternative responses to workplace situations based on personal,  
18.02.1 professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 18.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 18.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 19.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 19.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 19.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 19.03 Develop a personal budget and financial goals. FL3.1
  - 19.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 19.05 Maintain financial records. FL3.3
  - 19.06 Read and reconcile financial statements. FL3.4
  - 19.07 Research, compare and contrast investment opportunities.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 4  
**Course Number:** 8766040  
**Course Credit:** 1

**Course Description:**

20.0 Perform power transfer system service--The student will be able to:

- 20.01 Replace drive components.
- 20.02 Remove and repair clutches.

21.0 Service and repair lubrication systems--The student will be able to:

- 21.01 Replace seals and gaskets.
- 21.02 Identify lubrication systems.
- 21.03 Service and repair lubrication systems.

22.0 Perform basic electrical system service--The student will be able to:

- 22.01 Identify ignition systems and components.
- 22.02 Perform basic electrical tests.
- 22.03 Replace electrical system components.
- 22.04 Identify and test batteries.
- 22.05 Service batteries according to manufacturer's specifications.

23.0 Service and repair cooling and exhaust systems--The student will be able to:

- 23.01 Service air cooling fins and screens.
- 23.02 Service two-cycle exhaust systems.
- 23.03 Service four-cycle exhaust systems.

24.0 Repair and recondition basic engine components--The student will be able to:

- 24.01 Identify types of internal combustion engines.
- 24.02 Explain the basic principles of the operation of types of internal combustion engines.
- 24.03 Locate engine serial and model numbers.
- 24.04 Identify engine assemblies and systems.
- 24.05 Disassemble engines.
- 24.06 Clean and inspect heads for cracks, warpage and damaged spark plug threads.

25.0 Apply industry-related science to small gas engine service--The student will be able to:

- 25.01 Explain how temperature extremes, chemical reactions, and moisture content affect mechanical systems.

- 25.02 Draw conclusions or make inferences from data.
- 25.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
- 25.04 Measure pressure in terms of pounds per square inch (PSI).
- 26.0 Service and repair starting systems--The student will be able to:
  - 26.01 Service and repair manual starting systems.
  - 26.02 Service and repair electrical starting systems.
  - 26.03 Test and service battery starting systems.
- 27.0 Perform basic tune-up service--The student will be able to:
  - 27.01 Drain and refill oil, if applicable.
  - 27.02 Identify spark plugs and special applications.
  - 27.03 Remove, adjust and replace spark plugs.
  - 27.04 Service filters and breathers.
  - 27.05 Adjust ignition systems timing.
  - 27.06 Inspect and service power transfer system.
  - 27.07 Adjust valves.
- 28.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
  - 28.01 Describe the nature and types of business organizations. SY 1.0
  - 28.02 Explain the effect of key organizational systems on performance and quality.
  - 28.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 28.04 Explain the impact of the global economy on business organizations.
- 29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
  - 29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 29.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 29.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 30.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
  - 30.01 Identify and demonstrate positive work behaviors needed to be employable.ECD 1.0
  - 30.02 Develop personal career plan that includes goals, objectives, and strategies.ECD 2.0
  - 30.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 30.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 30.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 30.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 30.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 30.08 Research the benefits of ongoing professional development. ECD 9.0

30.09 Examine and describe entrepreneurship opportunities as a career planning option.

ECD 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 5  
**Course Number:** 8766050  
**Course Credit:** 1

**Course Description:**

31.0 Diagnose and repair ignition systems--The student will be able to:

- 31.01 Identify and diagnose ignition systems and components.
- 31.02 Repair magneto ignition systems.
- 31.03 Repair solid-state ignition systems.
- 31.04 Repair battery ignition systems.
- 31.05 Repair impulse ignition systems.
- 31.06 Diagnose magneto ignition systems.
- 31.07 Diagnose solid-state ignition systems.
- 31.08 Diagnose battery ignition systems.
- 31.09 Diagnose impulse ignition systems.

32.0 Service, repair and adjust engine controls--The student will be able to:

- 32.01 Service, repair and adjust governor speed controls.
- 32.02 Service, repair and adjust remote speed controls.
- 32.03 Service, repair and adjust manual start-stop controls.
- 32.04 Service, repair and adjust electrical start-stop controls.
- 32.05 Service, repair and adjust zone systems.
- 32.06 Service, repair and adjust blade clutch controls.
- 32.07 Service, repair and adjust chain brake systems.
- 32.08 Comply with the Consumer Protection Act (CPA) for three-second stops.
- 32.09 Comply with the CPA for interlocks.
- 32.10 Comply with the CPA for blade tip speed.
- 32.11 Read and interpret CPA rules and regulations.

33.0 Diagnose, service, repair and adjust electrical systems--The student will be able to:

- 33.01 Operate electrical testing instruments.
- 33.02 Perform electrical system tests.
- 33.03 Replace electrical system components.
- 33.04 Diagnose electrical system components.
- 33.05 Service, repair and adjust charging systems.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 6  
**Course Number:** 8766060  
**Course Credit:** 1

**Course Description:**

34.0 Demonstrate proficiency in repairing and maintaining basic two-stroke cycle engines--  
 The student will be able to:

- 34.01 Remove, clean and inspect piston rods and assemblies.
- 34.02 Measure out-of-round piston and cylinder.
- 34.03 Check the total bearing surface of connecting rod bearings.
- 34.04 Measure piston skirts and ring grooves.
- 34.05 Measure the piston ring gap in the cylinder bore.
- 34.06 Install piston pins according to manufacturer's specifications.
- 34.07 Check rod and piston assembly alignment.
- 34.08 Install rings on pistons.
- 34.09 Install piston rod assemblies.
- 34.10 Check needle bearings.
- 34.11 Inspect crankshafts and install seals.
- 34.12 Inspect, clean and/or replace reed valves.
- 34.13 Reassemble engines.
- 34.14 Diagnose head problems by use of the visual inspection method.
- 34.15 Diagnose head problems by use of the compression tester method.
- 34.16 Diagnose head problems by use of the cylinder air pressure method.
- 34.17 Measure and check crankshafts with a micrometer to diagnose engine problems.

35.0 Demonstrate proficiency in repairing and maintaining basic four-stroke cycle engines--  
 The student will be able to:

- 35.01 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 35.02 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 35.03 Grind valve seats and reface valves.
- 35.04 Check and inspect springs for free height, distortion and installed height.
- 35.05 Adjust valve lash.
- 35.06 Remove and inspect camshafts and lifters.
- 35.07 Measure camshafts.
- 35.08 Service camshaft bearings.
- 35.09 Clean and inspect lifters for wear.
- 35.10 Time valve drive assemblies.
- 35.11 Remove piston from rods assemblies.
- 35.12 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 35.13 Check piston pins and bosses for wear.
- 35.14 Measure piston ring lands width, out-of-round and taper.
- 35.15 Measure the piston ring gap in the cylinder bore.

- 35.16 Install and fit piston pins.
- 35.17 Check rod and piston assembly alignment.
- 35.18 Remove and replace rod bearings.
- 35.19 Hone and clean cylinders.
- 35.20 Install rings on pistons.
- 35.21 Measure and check crankshafts with a micrometer.
- 35.22 Check for end play.
- 35.23 Check the bearing bore with a telescoping gage using special tools provided by the engine manufacturer.
- 35.24 Reassemble engines.
- 35.25 Install oil seals.
- 35.26 Diagnose valve and head problems by use of the visual inspection method, i.e., water contamination vs. fuel-rich or lean carburetor adjustment.
- 35.27 Diagnose valve and head problems by use of the compression tester method.
- 35.28 Diagnose valve and head problems by use of the cylinder air pressure method.
- 35.29 Diagnose valve and head problems by use of the stethoscope method.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 7  
**Course Number:** 8766070  
**Course Credit:** 1

**Course Description:**

36.0 Demonstrate proficiency in repairing engine interior components--The student will be able to:

- 36.01 Service, repair and adjust valve systems.
- 36.02 Service, repair and adjust rings, bores and pistons.
- 36.03 Service, repair and adjust crankshafts and bearings.
- 36.04 Service, repair and adjust rods.
- 36.05 Service, repair and adjust lubrication systems.
- 36.06 Service, repair and adjust internal governor.
- 36.07 Service, repair and adjust internal components timing.
- 36.08 Assemble complete engines to manufacturer's specifications.
- 36.09 Diagnose causes of component failures to determine if they are due to friction, resulting from poor lubrication or contaminated fuel or to normal wear.

37.0 Demonstrate proficiency in diagnosing and repairing power transfer systems--The student will be able to:

- 37.01 Repair manual transmissions.
- 37.02 Repair differentials.
- 37.03 Identify power transfer system components.
- 37.04 Replace drive components.
- 37.05 Remove and replace hydraulic pump systems.
- 37.06 Diagnose manual transmissions.
- 37.07 Diagnose differentials.
- 37.08 Diagnose drive components.

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**Florida Department of Education  
Student Performance Standards**

**Course Title:** Gasoline Engine Service Technology 8  
**Course Number:** 8766080  
**Course Credit:** 1

**Course Description:**

38.0 Demonstrate applied communication skills--The student will be able to:

- 38.01 Draw and interpret electrical, electronic, hydraulic and mechanical schematics.
- 38.02 Write reports.
- 38.03 Maintain test logs.
- 38.04 Make equipment failure reports.
- 38.05 Specify and requisition components.
- 38.06 Compose technical letters
- 38.07 Write formal reports of laboratory experiences.

39.0 Demonstrate proficiency in servicing repairing and adjusting specific types of engines--  
The student will be able to:

- 39.01 Service, repair and adjust lawn and garden equipment.
- 39.02 Service, repair and adjust commercial golf course equipment.
- 39.03 Service, repair and adjust commercial industrial equipment.



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**Florida Department of Education  
Curriculum Framework**

**Program Title:** Motorcycle Service Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	8766100	I470616
CIP Number	0647.060601	0647.060601
Grade Level	9-12, 30, 31	30, 31
Standard Length	10 Credit	1500 Hours
Teacher Certification	MOTORCYCLE @7 G	MOTORCYCLE @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3052	49-3052
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 10.0 Language: 9.0 Reading: 10.0

### **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 the motorcycle services technology industry, and demonstrates such elements of the industry as planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

## Program Structure

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

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MOM0001	Assembler (Setup)	150	49-3052
B	MOM0002	Parts Clerk	200	49-3052
C	MOM0100	Helper, Mechanic	400	49-3052
D	MOM0400	Motorcycle Mechanic	750	49-3052

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8766110	Motorcycle Service 1	1 credit	49-3052	2
B	8766120	Motorcycle Service 2	1 credit	49-3052	2
	8766130	Motorcycle Service 3	1 credit		
C	8766140	Motorcycle Service 4	1 credit	49-3052	2
	8766150	Motorcycle Service 5	1 credit		
D	8766160	Motorcycle Service 6	1 credit	49-3052	2
	8766170	Motorcycle Service 7	1 credit		
	8766180	Motorcycle Service 8	1 credit		
	8766190	Motorcycle Service 9	1 credit		
	8766200	Motorcycle Service 10	1 credit		

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The

activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Identify personal and industry safety requirements.
- 02.0 Demonstrate the proper use and care of basic shop tools and equipment.
- 03.0 Demonstrate appropriate set-up procedures.

- 04.0 Demonstrate proficiency in performing routine preventative maintenance services.
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Demonstrate industry-related math skills.
- 07.0 Demonstrate proficiency in parts inventory identification and repair order processing.
- 08.0 Demonstrate language arts knowledge and skills
- 09.0 Solve problems using critical thinking skills, creativity and innovation.
- 10.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 11.0 Perform basic services and minor repairs.
- 12.0 Perform basic frame and suspension service.
- 13.0 Perform basic wheel, tire and brake service.
- 14.0 Perform basic electrical system service.
- 15.0 Diagnose service and repair cooling systems.
- 16.0 Diagnose, repair and recondition basic engine components.
- 17.0 Use information technology tools
- 18.0 Describe the importance of professional ethics and legal responsibilities.
- 19.0 Demonstrate personal money-management concepts, procedures, and strategies
- 20.0 Apply industry-related science to motorcycle service.
- 21.0 Diagnose service and repair frames and suspension components.
- 22.0 Diagnose service and repair wheels, tires, and brakes.
- 23.0 Diagnose service and repair drive trains.
- 24.0 Diagnose service and repair fuel and exhaust systems.
- 25.0 Troubleshoot and repair electrical-system components.
- 26.0 Tune up motorcycles.
- 27.0 Diagnose, repair and recondition engines.
- 28.0 Demonstrate the proper use of industry tools and equipment.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 31.0 Explain the importance of employability and entrepreneurship skills

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**Florida Department of Education  
Student Performance Standards**

**Program Title: Motorcycle Service Technology**  
**PSAV Number: I470616**

**Course Number: MOM0001**  
**Occupational Completion Point: A**  
**Assembler (Setup) – 150 Hours – SOC Code 49-3052**

- 01.0 Identify personal and industry safety requirements--The student will be able to:
- 01.01 Identify federal and state standards for health and safety, including OSHA and the "Right-to-Know" law.
  - 01.02 Identify safety requirements for shop organization and management.
  - 01.03 Identify safety requirements for the use of industry tools and equipment.
  - 01.04 Identify fire-safety precautions.
  - 01.05 Identify electrical-safety precautions.
- 02.0 Demonstrate the proper use and care of basic shop tools and equipment--The student will be able to:
- 02.01 Identify general and specialized hand tools.
  - 02.02 Identify and use power tools.
  - 02.03 Identify and use fasteners.
- 03.0 Demonstrate appropriate set-up procedures--The student will be able to:
- 03.01 Identify and interpret vehicle identification number information.
  - 03.02 Inspect tires; check and adjust air pressure.
  - 03.03 Check for proper fluid levels.
  - 03.04 Check lamp circuits.
  - 03.05 Inspect and fill battery.
  - 03.06 Clean engine.
  - 03.07 Install cables, hoses and electrical assemblies.
  - 03.08 Inspect cables, connectors, clamps and hold-downs; adjust as necessary.
  - 03.09 Check drive chain tension.
- 04.0 Demonstrate proficiency in performing routine preventative maintenance services--The student will be able to:
- 04.01 Identify and describe typical motorcycle lubricants and lubricant properties.
  - 04.02 Inspect and test head and tail lamp circuits; aim headlights and replace bulbs.
  - 04.03 Perform battery state-of-charge test; perform slow/fast battery charge.
  - 04.04 Inspect and clean battery cables, connectors, clamps and hold-downs; repair or replace as needed.
  - 04.05 Inspect and test fusible links, circuit breakers and fuses; replace as needed.
  - 04.06 Check radiator coolant level (if applicable), test and add coolant.
  - 04.07 Check fluid levels and change fluids and filters.

- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 05.02 Locate, organize and reference written information from various sources. CM 3.0
  - 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 05.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 05.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: MOM0002**

**Occupational Completion Point: B**

**Parts Clerk – 200 Hours – SOC Code 49-3052**

- 06.0 Demonstrate industry-related math skills--The student will be able to:
- 06.01 Measure tolerance(s) using millimeters and inches.
  - 06.02 Perform metric to SAE and SAE to metric conversions.
- 07.0 Demonstrate proficiency in parts inventory identification and repair order processing--  
The student will be able to:
- 07.01 Read and interpret information in parts and service manuals and other technical media.
  - 07.02 Read and understand graphs, charts, diagrams and tables commonly used in the industry.
  - 07.03 Write and process work orders.
  - 07.04 Prepare cost estimates for jobs using service and flat-rate standards.
  - 07.05 Perform basic parts inventory tracking.
  - 07.06 Interpret and verify complaint; determine needed repairs.
- 08.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 08.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 08.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 08.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 09.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 09.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS 1.0
  - 09.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 09.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0

09.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

10.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:

- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 10.02 Explain emergency procedures to follow in response to workplace accidents.
- 10.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: MOM0100**

**Occupational Completion Point: C**

**Helper, Mechanic – 400 Hours – SOC Code 49-3052**

11.0 Perform basic services and minor repairs--The student will be able to:

- 11.01 Demonstrate the proper use of industry tools and equipment.
- 11.02 Identify, select and use appropriate sealant.
- 11.03 Service air filtration.
- 11.04 Service and diagnose batteries.
- 11.05 Service lubrication systems.
- 11.06 Identify components of air and liquid cooling systems by name and function.
- 11.07 Remove, remount and balance tires.
- 11.08 Diagnose, service and repair chain and belt final drive components.

12.0 Perform basic frame and suspension service--The student will be able to:

- 12.01 Identify different front- and rear-suspension systems and explain their operation.
- 12.02 Identify the parts and functions of different frames and suspension systems.
- 12.03 Install and route cables, hoses and wiring harnesses.
- 12.04 Explain how wheels, tires and suspension affect chassis performance and driveability.

13.0 Perform basic wheel, tire and brake service--The student will be able to:

- 13.01 Explain how wheels, tires and suspension affect chassis performance and driveability.
- 13.02 Replace and true a wheel assembly.
- 13.03 Diagnose and service wheel bearings and seals.

14.0 Perform basic electrical system service--The student will be able to:

- 14.01 Identify and use basic electrical system test equipment.
- 14.02 Use basic DC electrical theory to select appropriate test procedures.
- 14.03 Inspect and test fusible links, circuit breakers and fuses; replace as needed.
- 14.04 Check electrical circuits with a test light; determine needed repairs.

15.0 Diagnose, service, and repair cooling systems--The student will be able to:

- 15.01 Identify the components of air and liquid cooling systems by name and function.



- 15.02 Diagnose service and repair air-cooling systems.
- 15.03 Diagnose service and repair liquid cooling systems.
- 16.0 Diagnose, repair and recondition basic engine components--The student will be able to:
  - 16.01 Explain the engine operating theory.
  - 16.02 Recondition a two-stroke engine top-end.
  - 16.03 Diagnose and repair oil-delivery systems.
- 17.0 Use information technology tools. -- The students will be able to:
  - 17.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 17.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 17.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 18.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
  - 18.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 18.02 Evaluate alternative responses to workplace situations based on personal,
    - 18.02.1 professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 18.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 18.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 19.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
  - 19.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 19.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 19.03 Develop a personal budget and financial goals. FL3.1
  - 19.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 19.05 Maintain financial records. FL3.3
  - 19.06 Read and reconcile financial statements. FL3.4
  - 19.07 Research, compare and contrast investment opportunities.

**Course Number: MOM0400**  
**Occupational Completion Point: D**  
**Motorcycle Mechanic – 750 Hours – SOC Code 49-3052**

- 20.0 Apply industry-related science to motorcycle service--The student will be able to:
  - 20.01 Explain how temperature extremes, chemical reactions and moisture content affect motorcycle systems.

- 20.02 Draw conclusions or make inferences from data.
  - 20.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
  - 20.04 Measure pressure in terms of pounds per square inch (PSI).
- 21.0 Diagnose, service, and repair frames and suspension--The student will be able to:
- 21.01 Service and repair front suspension.
  - 21.02 Service and repair rear suspension.
  - 21.03 Inspect, remove, and replace frames.
- 22.0 Diagnose, service, and repair wheels, tires and brakes--The student will be able to:
- 22.01 Diagnose and repair mechanical disc and drum brake systems and components.
  - 22.02 Diagnose and repair hydraulic disc and drum brake systems and components.
  - 22.03 Diagnose and repair ABS braking systems and other advanced stopping systems.
- 23.0 Diagnose, service, and repair drive trains--The student will be able to:
- 23.01 Diagnose, service, and repair primary-drive systems.
  - 23.02 Diagnose, service, and repair clutch assemblies.
  - 23.03 Diagnose, service, and repair transmissions.
  - 23.04 Diagnose, service, and repair shaft drives.
  - 23.05 Diagnose and repair kickstart systems.
- 24.0 Diagnose, service, and repair fuel and exhaust systems--The student will be able to:
- 24.01 Identify components and operation of carburetion and fuel-injection systems.
  - 24.02 Diagnose, service and repair slide-type carburetors.
  - 24.03 Diagnose, service and repair constant-velocity-type (CV-type) carburetors.
  - 24.04 Diagnose, service and repair fixed-venturi carburetors.
  - 24.05 Diagnose, service and repair fuel-injection systems.
  - 24.06 Diagnose, service and repair exhaust systems.
  - 24.07 Diagnose, service and repair other fuel-delivery-system components.
- 25.0 Troubleshoot and repair electrical-system components--The student will be able to:
- 25.01 Utilize electrical test equipment to isolate defective components.
  - 25.02 Read and interpret a wiring diagram.
  - 25.03 Troubleshoot and repair wiring harnesses.
  - 25.04 Troubleshoot and repair battery/points ignition systems.
  - 25.05 Troubleshoot and repair battery-operated electronic ignition systems.
  - 25.06 Troubleshoot and repair magneto-ignition systems.
  - 25.07 Troubleshoot and repair capacitive-discharge-ignition (CDI) systems.
  - 25.08 Troubleshoot and repair half-wave and full-wave charging systems.
  - 25.09 Troubleshoot and repair three-phase charging systems.
  - 25.10 Troubleshoot and repair electrical starter systems.
  - 25.11 Troubleshoot and repair direct current (DC) generators.
  - 25.12 Troubleshoot and repair warning systems.

- 26.0 Tune up motorcycles--The student will be able to:
- 26.01 Diagnose driveability problems.
  - 26.02 Adjust the cam chain tension.
  - 26.03 Adjust the valve clearances.
  - 26.04 Replace the ignition points, condenser, and spark plugs.
  - 26.05 Check and set the ignition timing.
  - 26.06 Adjust the carburetor and service the fuel-delivery systems.
  - 26.07 Service the air-filtration systems.
  - 26.08 Service and diagnose batteries.
  - 26.09 Service the lubrication systems.
- 27.0 Diagnose, repair, and recondition engines--The student will be able to:
- 27.01 Explain the engine operating theory.
  - 27.02 Recondition a single-cylinder four-stroke engine top-end.
  - 27.03 Recondition a multi-cylinder four-stroke engine top-end.
  - 27.04 Recondition a two-stroke engine top-end.
  - 27.05 Rebuild a four-stroke head.
  - 27.06 Recondition a single-cylinder four-stroke engine bottom-end.
  - 27.07 Recondition a multi-cylinder four-stroke engine bottom-end.
  - 27.08 Recondition a two-stroke engine bottom-end.
  - 27.09 Rebuild a built-up crankshaft.
  - 27.10 Service a plain-bearing crankshaft.
  - 27.11 Diagnose and repair electric-starter drive systems.
  - 27.12 Diagnose and repair oil-delivery systems.
- 28.0 Demonstrate the proper use of industry tools and equipment--The student will be able to:
- 28.01 Utilize oxyacetylene welding outfit for heating, welding, brazing and cutting.
  - 28.02 Use heating devices to perform service procedures.
  - 28.03 Recondition cylinders.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 29.01 Describe the nature and types of business organizations. SY 1.0
  - 29.02 Explain the effect of key organizational systems on performance and quality.
  - 29.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 29.04 Explain the impact of the global economy on business organizations.
- 30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 30.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 30.04 Employ mentoring skills to inspire and teach others. LT 5.0

31.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 31.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 31.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 31.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 31.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 31.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 31.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 31.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 31.08 Research the benefits of ongoing professional development. ECD 9.0
- 31.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 1  
**Course Number:** 8766110  
**Course Credit:** 1

**Course Description:**

- 01.0 Identify personal and industry safety requirements--The student will be able to:
- 01.01 Identify federal and state standards for health and safety, including OSHA and the "Right-to-Know" law.
  - 01.02 Identify safety requirements for shop organization and management.
  - 01.03 Identify safety requirements for the use of industry tools and equipment.
  - 01.04 Identify fire-safety precautions.
  - 01.05 Identify electrical-safety precautions.
- 02.0 Demonstrate the proper use and care of basic shop tools and equipment--The student will be able to:
- 02.01 Identify general and specialized hand tools.
  - 02.02 Identify and use power tools.
  - 02.03 Identify and use fasteners.
- 03.0 Demonstrate appropriate set-up procedures--The student will be able to:
- 03.01 Identify and interpret vehicle identification number information.
  - 03.02 Inspect tires; check and adjust air pressure.
  - 03.03 Check for proper fluid levels.
  - 03.04 Check lamp circuits.
  - 03.05 Inspect and fill battery.
  - 03.06 Clean engine.
  - 03.07 Install cables, hoses and electrical assemblies.
  - 03.08 Inspect cables, connectors, clamps and hold-downs; adjust as necessary.
  - 03.09 Check drive chain tension.
- 04.0 Demonstrate proficiency in performing routine preventative maintenance services--The student will be able to:
- 04.01 Identify and describe typical motorcycle lubricants and lubricant properties.
  - 04.02 Inspect and test head and tail lamp circuits; aim headlights and replace bulbs.
  - 04.03 Perform battery state-of-charge test; perform slow/fast battery charge.
  - 04.04 Inspect and clean battery cables, connectors, clamps and hold-downs; repair or replace as needed.
  - 04.05 Inspect and test fusible links, circuit breakers and fuses; replace as needed.
  - 04.06 Check radiator coolant level (if applicable), test and add coolant.
  - 04.07 Check fluid levels and change fluids and filters.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 2  
**Course Number:** 8766120  
**Course Credit:** 1

**Course Description:**

- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 05.02 Locate, organize and reference written information from various sources. CM 3.0
  - 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 05.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 05.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 06.0 Demonstrate industry-related math skills--The student will be able to:
- 06.01 Measure tolerance(s) using millimeters and inches.
  - 06.02 Perform metric to SAE (and SAE to metric) conversions.
- 08.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 08.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 08.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 08.03 Present information formally and informally for specific purposes and audiences. AF2.9

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 3  
**Course Number:** 8766130  
**Course Credit:** 1

**Course Description:**

- 07.0 Demonstrate proficiency in parts inventory identification and repair order processing--  
 The student will be able to:
- 07.01 Read and interpret information in parts and service manuals and other technical media.
  - 07.02 Read and understand graphs, charts, diagrams and tables commonly used in the industry.
  - 07.03 Write and process work orders.
  - 07.04 Prepare cost estimates for jobs using service- and flat-rate standards.
  - 07.05 Perform basic parts inventory tracking.
  - 07.06 Interpret and verify complaint; determine needed repairs.
- 11.0 Perform basic services and minor repairs--The student will be able to:
- 11.01 Demonstrate the proper use of industry tools and equipment.
  - 11.02 Identify, select and use appropriate sealant.
  - 11.03 Service air filtration.
  - 11.04 Service and diagnose batteries.
  - 11.05 Service lubrication systems.
  - 11.06 Identify components of air and liquid cooling systems by name and function.
  - 11.07 Remove, remount and balance tires.
  - 11.08 Diagnose, service and repair chain and belt final drive components.
- 12.0 Perform basic frame and suspension service--The student will be able to:
- 12.01 Identify different front-and rear-suspension systems and explain their operation.
  - 12.02 Identify the parts and functions of different frames and suspension systems.
  - 12.03 Install and route cables, hoses and wiring harnesses.
  - 12.04 Explain how wheels, tires and suspension affect chassis performance and driveability.
- 09.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 09.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 09.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 09.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 09.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

- 10.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 10.02 Explain emergency procedures to follow in response to workplace accidents.
  - 10.03 Create a disaster and/or emergency response plan. SHE 2.0



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 4  
**Course Number:** 8766140  
**Course Credit:** 1

**Course Description:**

13.0 Perform basic wheel, tire and brake service--The student will be able to:

- 13.01 Explain how wheels, tires and suspension affect chassis performance and driveability.
- 13.02 Replace and true a wheel assembly.
- 13.03 Diagnose and service wheel bearings and seals.

14.0 Perform basic electrical system service--The student will be able to:

- 14.01 Identify and use basic electrical system test equipment.
- 14.02 Use basic DC electrical theory to select appropriate test procedures.
- 14.03 Inspect and test fusible links, circuit breakers and fuses; replace as needed.
- 14.04 Check electrical circuits with a test light; determine needed repairs.

17.0 Use information technology tools. -- The students will be able to:

- 17.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 17.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 17.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 5  
**Course Number:** 8766150  
**Course Credit:** 1

**Course Description:**

- 15.0 Diagnose, service, and repair cooling systems--The student will be able to:
- 15.01 Identify the components of air and liquid cooling systems by name and function.
  - 15.02 Diagnose service and repair air-cooling systems.
  - 15.03 Diagnose service and repair liquid cooling systems.
- 16.0 Diagnose, repair and recondition basic engine components--The student will be able to:
- 16.01 Explain the engine operating theory.
  - 16.02 Recondition a two-stroke engine top-end.
  - 16.03 Diagnose and repair oil-delivery systems.
- 18.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 18.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 18.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 18.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 18.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 19.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 19.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 19.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 19.03 Develop a personal budget and financial goals. FL3.1
  - 19.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 19.05 Maintain financial records. FL3.3
  - 19.06 Read and reconcile financial statements. FL3.4
  - 19.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 6  
**Course Number:** 8766160  
**Course Credit:** 1

**Course Description:**

- 20.0 Apply industry-related science to motorcycle service--The student will be able to:
- 20.01 Explain how temperature extremes, chemical reactions and moisture content affect motorcycle systems.
  - 20.02 Draw conclusions or make inferences from data.
  - 20.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials and know the proper precautions required for handling such materials.
  - 20.04 Measure pressure in terms of pounds per square inch (PSI).
- 21.0 Diagnose, service, and repair frames and suspension components--The student will be able to:
- 21.01 Service and repair front suspension.
  - 21.02 Service and repair rear suspension.
  - 21.03 Inspect, remove, and replace frames.
- 29.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 29.01 Describe the nature and types of business organizations. SY 1.0
  - 29.02 Explain the effect of key organizational systems on performance and quality.
  - 29.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 29.04 Explain the impact of the global economy on business organizations.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 7  
**Course Number:** 8766170  
**Course Credit:** 1

**Course Description:**

22.0 Diagnose, service, and repair wheels, tires and brakes--The student will be able to:

- 22.01 Diagnose and repair mechanical disc and drum brake systems and components.
- 22.02 Diagnose and repair hydraulic disc and drum brake systems and components.
- 22.03 Diagnose and repair ABS braking systems and other advanced stopping systems.

30.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 30.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 30.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 30.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 30.04 Employ mentoring skills to inspire and teach others. LT 5.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 8  
**Course Number:** 8766180  
**Course Credit:** 1

**Course Description:**

23.0 Diagnose, service, and repair drive trains--The student will be able to:

- 23.01 Diagnose, service, and repair primary-drive systems.
- 23.02 Diagnose, service, and repair clutch assemblies.
- 23.03 Diagnose, service, and repair transmissions.
- 23.04 Diagnose, service, and repair shaft drives.
- 23.05 Diagnose and repair kickstart systems.

24.0 Diagnose, service, and repair fuel and exhaust systems--The student will be able to:

- 24.01 Identify components and operation of carburetion and fuel-injection systems.
- 24.02 Diagnose service and repair slide-type carburetors.
- 24.03 Diagnose service and repair constant-velocity-type (CV-type) carburetors.
- 24.04 Diagnose service and repair fixed-venturi carburetors.
- 24.05 Diagnose service and repair fuel-injection systems.
- 24.06 Diagnose service and repair exhaust systems.
- 24.07 Diagnose service and repair other fuel-delivery-system components.

31.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 31.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 31.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 31.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 31.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 31.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 31.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 31.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 31.08 Research the benefits of ongoing professional development. ECD 9.0
- 31.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 9  
**Course Number:** 8766190  
**Course Credit:** 1

**Course Description:**

25.0 Troubleshoot and repair electrical-system components--The student will be able to:

- 25.01 Utilize electrical test equipment to isolate defective components.
- 25.02 Read and interpret a wiring diagram.
- 25.03 Troubleshoot and repair wiring harnesses.
- 25.04 Troubleshoot and repair battery/points ignition systems.
- 25.05 Troubleshoot and repair battery-operated electronic ignition systems.
- 25.06 Troubleshoot and repair magneto-ignition systems.
- 25.07 Troubleshoot and repair capacitive-discharge-ignition (CDI) systems.
- 25.08 Troubleshoot and repair half-wave and full-wave charging systems.
- 25.09 Troubleshoot and repair three-phase charging systems.
- 25.10 Troubleshoot and repair electrical starter systems.
- 25.11 Troubleshoot and repair direct current (DC) generators.
- 25.12 Troubleshoot and repair warning systems.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Motorcycle Service 10  
**Course Number:** 8766200  
**Course Credit:** 1

**Course Description:**

26.0 Tune up motorcycles--The student will be able to:

- 26.01 Diagnose driveability problems.
- 26.02 Adjust the cam chain tension.
- 26.03 Adjust the valve clearances.
- 26.04 Replace the ignition points, condenser, and spark plugs.
- 26.05 Check and set the ignition timing.
- 26.06 Adjust the carburetor and service the fuel-delivery systems.
- 26.07 Service the air-filtration systems.
- 26.08 Service and diagnose batteries.
- 26.09 Service the lubrication systems.

27.0 Diagnose, repair, and recondition engines--The student will be able to:

- 27.01 Explain the engine operating theory.
- 27.02 Recondition a single-cylinder four-stroke engine top-end.
- 27.03 Recondition a multi-cylinder four-stroke engine top-end.
- 27.04 Recondition a two-stroke engine top-end.
- 27.05 Rebuild a four-stroke head.
- 27.06 Recondition a single-cylinder four-stroke engine bottom-end.
- 27.07 Recondition a multi-cylinder four-stroke engine bottom-end.
- 27.08 Recondition a two-stroke engine bottom-end.
- 27.09 Rebuild a built-up crankshaft.
- 27.10 Service a plain-bearing crankshaft.
- 27.11 Diagnose and repair electric-starter drive systems.
- 27.12 Diagnose and repair oil-delivery systems.

28.0 Demonstrate the proper use of industry tools and equipment--The student will be able to:

- 28.01 Utilize oxyacetylene welding outfit for heating, welding, brazing and cutting.
- 28.02 Use heating devices to perform service procedures.
- 28.03 Recondition cylinders.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

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

	Secondary	PSAV
Program Number	9500100	T660100
CIP Number	0647060507	0647060507
Grade Level	9-12, 30, 31	30, 31
Standard Length	5 Credits	620 Hours
Teacher Certification	DIESEL MECH @7 G	DIESEL MECH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3031	49-3031
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: maintaining and repairing diesel engines, performing diesel engine and bus preventive maintenance (PMI) inspections, maintaining and repairing ADA accessible lifts and ramps, maintaining and repairing basic electrical systems, and maintaining, and repairing steering and suspension systems.



The course content will also include training in communication, leadership, human relations, transit safety awareness, MSDS, employability skills, and safe efficient work practices.

### Program Structure

This program is a planned sequence of instruction consisting of three programs of instruction consisting of 15 occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0810	Transit Equipment Preventive Maintenance Technician	200	49-3031
B	DIM0811	Transit Basic Electrical Systems Technician	120	49-3031
C	DIM0812	Transit Wheelchair Lift/Ramp Technician	60	49-3031
D	DIM0813	Transit Diesel Engine Preventive Maintenance Technician	120	49-3031
E	DIM0814	Transit Steering And Suspension Technician	120	49-3031

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	9500110	Transit Bus Service 1	1 credit	49-3031	2
B	9500120	Transit Bus Service 2	1 credit	49-3031	2
C	9500130	Transit Bus Service 3	1 credit	49-3031	2
D	9500140	Transit Bus Service 4	1 credit	49-3031	2
E	9500150	Transit Bus Service 5	1 credit	49-3031	2

The safety guidelines in the student performance standards have been recommended in the ASE Program Certification Standards administered by the National Automotive Technicians Education Foundation (NATEF).

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

The purpose of this program is to prepare students for employment as transit technicians, train existing employees to become FTMC certified transit technicians and to prepare existing technicians for the ASE series of Transit Bus tests.

It is recommended that students complete the five OCP's for each technician level before advancing to the next tier. Transit technician I and II are prerequisites for the Transit Technician III, and ultimately, the FTMC Transit Technician certification.

The courses may be taken in any sequence within their respective tier, but tiers must be taken sequentially, starting with tier 1, then tier 2, and ending with tier 3. Students must demonstrate proficiency in the preceding tier prior to advancement to the next higher tier.

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state

designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Identify shop organization, management, and safety requirements.
- 02.0 Demonstrate infection control procedures and practice general shop safety.
- 03.0 Demonstrate MSDS, AED, and CPR procedures and practice general shop safety.
- 04.0 Demonstrate the use of hardware and fasteners, basic tools and equipment.
- 05.0 Demonstrate workplace communication skills.
- 06.0 Demonstrate shop and occupational safety procedures.
- 07.0 Perform transit bus and forklift preventive maintenance.
- 08.0 Perform tire service, identification and repair.
- 09.0 Demonstrate mathematics knowledge and skills.
- 10.0 Demonstrate science knowledge and skills.
- 11.0 Demonstrate the qualifications for employment.
- 12.0 Demonstrate shop and occupational safety procedures.
- 13.0 Maintain and repair transit bus basic electrical systems and components.
- 14.0 Demonstrate language arts knowledge and skills
- 15.0 Solve problems using critical thinking skills, creativity and innovation.
- 16.0 Demonstrate the qualifications for employment.
- 17.0 Demonstrate shop and occupational safety procedures.
- 18.0 Maintain and repair transit bus wheelchair lift and ramp systems and components.
- 19.0 Use information technology tools
- 20.0 Describe the importance of professional ethics and legal responsibilities.
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies
- 22.0 Demonstrate the qualifications for employment.
- 23.0 Demonstrate shop and occupational safety procedures.
- 24.0 Perform engine preventive maintenance.
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment

- 26.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 27.0 Explain the importance of employability and entrepreneurship skills
- 28.0 Demonstrate the qualifications for employment.
- 29.0 Demonstrate shop and occupational safety procedures.
- 30.0 Maintain and repair transit bus steering and suspension systems.
- 31.0 Demonstrate the qualifications for employment.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Transit Technician 1  
PSAV Number: T660100**

**Course Number: DIM0810  
Occupational Completion Point: A  
Transit Equipment Preventive Maintenance Technician – 200 Hours – SOC Code 49-3031**

- 01.0 Identify shop and occupational safety procedures --The student will be able to:
- 01.01 Identify basic shop organization and management regulations.
  - 01.02 Identify required shop-safety practices.
  - 01.03 Identify and describe shop-maintenance procedures, including precautions for handling and storing work-related chemicals and hazardous materials.
- 02.0 Demonstrate infection control procedures and general shop safety--The student will be able to:
- 02.01 Understand how blood-borne pathogens are spread and how to clean contamination on environmental surfaces.
  - 02.02 Identify cleaning solutions that will kill the AIDS virus on environmental surfaces.
  - 02.03 Practice general shop safety.
- 03.0 Demonstrate MSDS, AED, and CPR procedures and practice general shop safety--The student will be able to:
- 03.01 Understand where the Material Safety Data Sheet booklet is located and how it is used.
  - 03.02 Understand, set-up, and use the Automated External Defibrillator.
  - 03.03 Learn the capabilities and limitations of cardiopulmonary resuscitation.
- 04.0 Demonstrate the use of hardware and fasteners, basic tools and equipment--The student will be able to:
- 04.01 Identify and use the following correctly and safely:
    - a. Basic hand tools
    - b. Basic welding tools and equipment
    - c. Power tools
    - d. Measuring and precision tools.
    - e. Basic and specialty hardware and fasteners.
  - 04.02 Read a digital multimeter.
- 05.0 Demonstrate workplace communication skills--The student will be able to:
- 05.01 Locate information in technical literature, such as a manufacturer's manual, in both print and computer versions.
  - 05.02 Read, interpret, and apply information from parts and service manuals.
  - 05.03 Read and follow written and oral instructions.

- 05.04 Read and interpret graphs, charts, diagrams, and tables commonly used in the diesel technology industry.
  - 05.05 Answer and ask questions coherently and concisely.
  - 05.06 Use basic keyboarding and computer skills.
  - 05.07 Use industry-related computer software.
  - 05.08 Interpret technical specification information and diagnose problems, both verbally and in writing.
  - 05.09 Solve basic transit technology problems by combining knowledge of transit systems with technical information and diagnostic data.
  - 05.10 Complete accurately the required information for journals, repair orders, invoices, time cards, job sheets, and forms.
  - 05.11 Demonstrate telephone and interpersonal communication skills to accurately and courteously exchange information with customers, co-worker, and supervisors.
- 06.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 06.01 Comply with safety regulations for all preventive maintenance technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 06.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 07.0 Perform transit bus and forklift preventive maintenance--The student will be able to:
- 07.01 Identify the types of preventive maintenance, including oil analysis, required for components and systems, according to manufacturer and company specifications.
  - 07.02 Schedule preventive-maintenance inspections at the miles and/or times required by manufacturer and company specifications.
  - 07.03 Perform preventive maintenance inspections and record results according to manufacturer and company specifications, including:
    - a. Air, parking, and anti-locking brake systems.
    - b. Wheels, bearings, hubs, and tires.
    - c. Heating and air-conditioning components, refrigerants, and system operations.
    - d. Hydraulic systems, including fluids, filters, lines, and reservoirs.
    - e. Tires, suspension, and drive train.
    - f. Other interior and exterior items as indicated on the Preventive Maintenance Work Order/Checklist.
  - 07.04 Test-drive equipment, where liability and safety allow such tests, and identify needed repairs.
- 08.0 Perform tire service, identification, and repair--The student will be able to:
- 08.01 Identify the types of tires, wheels, tread depth measurement, and sidewall inspection criteria.
  - 08.02 Understand relationship between tire size and speedometer, odometer, hubometer.
  - 08.03 Identify different wear indicator patterns and relationship to defective components.

- 09.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 09.03 Construct charts/tables/graphs using functions and data. AF3.5
- 10.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 10.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 10.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 11.0 Demonstrate the qualifications for employment--The student will be able to:
- 11.01 Demonstrate shop organization, management, and safety requirements for a preventive maintenance technician.
- 11.02 Demonstrate the use of tools and equipment required for a preventive maintenance technician.
- 11.03 Demonstrate workplace communication skills required by a preventive maintenance technician.
- 11.04 Demonstrate the application of math and science principles required for a preventive maintenance technician's job tasks.
- 11.05 Identify and demonstrate work habits of successful employees concerning:
- a. Quality of work
  - b. Work hours and schedule
  - c. Actions, initiative, teamwork, dependability, and responsible decision making
  - d. Self-control, responses to criticism, and relationships with customers and supervisors
  - e. Time management, cost effectiveness, and fair pricing
  - f. Personal hygiene, health habits, and professional appearance
  - g. Driving records, drug-free workplace, and industry policies
- 11.06 Obtain information about training and licensing requirements, equipment needs, responsibilities, pay, benefits, work conditions, risks, and opportunities for advancement.
- 11.07 Demonstrate knowledge of the "Right-to-Know" law, as recorded in (29 CFR 1910.1200)
- 11.08 Demonstrate employability skills as a transit bus preventive maintenance technician.

**Course Number: DIM0811**

**Occupational Completion Point: B**

**Transit Basic Electrical Systems Technician – 120 Hours – SOC Code 49-3031**

- 12.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 12.01 Comply with safety regulations for all basic electrical technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.



- 12.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 13.0 Maintain and repair transit bus basic electrical systems and components --The student will be able to:
- 13.01 Explain the theory and nature of electricity.
  - 13.02 Understand basic electrical terminology and symbols.
  - 13.03 Analyze electrical circuits.
  - 13.04 Work problems using Ohm's and Kirchoff's laws.
  - 13.05 Understand circuit characteristics: series, parallel, open, short.
  - 13.06 Explain the principals of relays and transistors.
  - 13.07 Understand mystery harness application.
  - 13.08 Explain magnetism and electromagnetic induction.
  - 13.09 Explain applications of alternating current (AC).
  - 13.10 Explain principles of direct current (DC) motors and generators.
  - 13.11 Explain principles of AC motors.
  - 13.12 Locate and match electrical units by their symbols on a wiring diagram.
  - 13.13 Set up and use voltmeters, ammeters, and ohmmeters.
- 14.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 14.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 14.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 14.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 15.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 15.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 15.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 15.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 15.04 Conduct technical research to gather information necessary for decision-making.PS 4.0
- 16.0 Demonstrate the qualifications for employment--The student will be able to:
- 16.01 Demonstrate shop organization, management, and safety requirements for a basic electrical systems technician.
  - 16.02 Demonstrate the use of tools and equipment required for a basic electrical systems technician.
  - 16.03 Demonstrate workplace communication skills required by a basic electrical systems technician.
  - 16.04 Demonstrate the application of math and science principles required for a basic electrical systems technician's job tasks.
  - 16.05 Demonstrate employability skills as a transit bus basic electrical systems technician.

**Course Number: DIM0812**  
**Occupational Completion Point: C**  
**Transit Wheelchair Lift/Ramp Technician – 60 Hours – SOC Code 49-3031**

- 17.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 17.01 Comply with safety regulations for all wheelchair lift and ramp activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 17.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 18.0 Maintain and repair transit bus wheelchair lift/ramp systems and components--The student will be able to:
- 18.01 Troubleshoot and repair the following:
  - 18.02 Wheelchair lift, pumps, hoses, and components
  - 18.03 Wheelchair ramp and associated hardware
  - 18.04 Troubleshoot and repair kneeler faults and components.
  - 18.05 Troubleshoot and repair lift hydraulic/electrical system.
- 19.0 Use information technology tools. -- The students will be able to:
- 19.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 19.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 19.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 20.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 20.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 20.02 Evaluate alternative responses to workplace situations based on personal, a. professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 20.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 20.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 21.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 21.03 Develop a personal budget and financial goals. FL3.1

- 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 21.05 Maintain financial records. FL3.3
- 21.06 Read and reconcile financial statements. FL3.4
- 21.07 Research, compare and contrast investment opportunities.

22.0 Demonstrate the qualifications for employment--The student will be able to:

- 22.01 Demonstrate shop organization, management, and safety requirements for a wheelchair lift/ramp systems technician.
- 22.02 Demonstrate the use of tools and equipment required for a wheelchair lift/ramp systems technician.
- 22.03 Demonstrate workplace communication skills required by a wheelchair lift/ramp systems technician.
- 22.04 Demonstrate the application of math and science principles required for a wheelchair lift/ramp systems technician's job tasks.
- 22.05 Demonstrate employability skills as a transit bus wheelchair lift/ramp systems technician.

**Course Number: DIM0813**

**Occupational Completion Point: D**

**Transit Diesel Engine Preventive Maintenance Technician – 120 Hours –  
SOC Code 49-3031**

23.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 23.01 Comply with safety regulations for all diesel engine technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 23.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

24.0 Perform diesel engine preventive maintenance--The student will be able to:

- 24.01 Identify types of bearings and their uses.
- 24.02 Identify seals, gaskets, and fasteners.
- 24.03 Identify drive power train components and functions.
- 24.04 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility.
- 24.05 Identify the types of preventive maintenance, including oil analysis, required for components and systems, according to manufacturer and company specifications.
- 24.06 Schedule preventive-maintenance inspections at the miles and/or times required by manufacturer and company specifications.
- 24.07 Perform preventive-maintenance inspections and record results according to manufacturer and company specifications.
- 24.08 Demonstrate the ability to remove correctly an oil sample for analysis.

25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 25.01 Describe the nature and types of business organizations. SY 1.0
- 25.02 Explain the effect of key organizational systems on performance and quality.
- 25.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 25.04 Explain the impact of the global economy on business organizations.
- 26.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 26.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 26.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 26.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 26.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 27.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 27.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 27.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 27.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 27.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 27.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 27.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 27.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 27.08 Research the benefits of ongoing professional development. ECD 9.0
- 27.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 28.0 Demonstrate the qualifications for employment--The student will be able to:
- 28.01 Demonstrate shop organization, management, and safety.
- 28.02 Demonstrate the use of tools and equipment required for a diesel engine technician.
- 28.03 Demonstrate workplace communication skills required by a diesel engine technician.
- 28.04 Demonstrate the application of math and science principles required for a diesel engine technician's job tasks.
- 28.05 Demonstrate employability skills as a transit diesel engine technician.

**Course Number: DIM0814****Occupational Completion Point: E****Transit Steering and Suspension Technician – 120 Hours – SOC Code 49-3031**

- 29.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 29.01 Comply with safety regulations for all steering and suspension technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.

29.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

30.0 Maintain and repair steering and suspension systems--The student will be able to:

30.01 Troubleshoot and repair the following:

- a. Conventional steering systems
- b. Hydraulic steering systems
- c. Rear-axle suspensions
- d. Front-axle suspensions

30.02 Service wheels, bearings, hubs, and seals.

30.03 Service tires.

30.04 Align bus frame.

30.05 Align bus height.

31.0 Demonstrate the qualifications for employment--The student will be able to:

31.01 Demonstrate shop organization, management, and safety requirements for a steering and suspension technician.

31.02 Demonstrate the use of tools and equipment required for a steering and suspension technician.

31.03 Demonstrate workplace communication skills required by a steering and suspension maintenance technician.

31.04 Demonstrate the application of math and science principles required for a steering and suspension technician's job tasks.

31.05 Demonstrate employability skills as a transit bus steering and suspension maintenance technician.

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 1  
**Course Number:** 9500110  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Identify shop organization, management, and safety requirements, demonstrating infection control procedures and practicing general shop safety, demonstrating MSDS, AED, and CPR procedures and practicing general shop safety, demonstrating the use of hardware and fasteners, basic tools and equipment, demonstrating workplace communication skills, demonstrating shop and occupational safety procedures, performing transit bus and forklift preventive maintenance, performing tire service, identification and repair, and demonstrating the qualifications for employment.

- 01.0 Identify shop and occupational safety procedures --The student will be able to:
- 01.01 Identify basic shop organization and management regulations.
  - 01.02 Identify required shop-safety practices.
  - 01.03 Identify and describe shop-maintenance procedures, including precautions for handling and storing work-related chemicals and hazardous materials.
- 02.0 Demonstrate infection control procedures and general shop safety--The student will be able to:
- 02.01 Understand how blood-borne pathogens are spread and how to clean contamination on environmental surfaces.
  - 02.02 Identify cleaning solutions that will kill the AIDS virus on environmental surfaces.
  - 02.03 Practice general shop safety.
- 03.0 Demonstrate MSDS, AED, and CPR procedures and practice general shop safety--The student will be able to:
- 03.01 Understand where the Material Safety Data Sheet booklet is located and how it is used.
  - 03.02 Understand, set-up, and use the Automated External Defibrillator.
  - 03.03 Learn the capabilities and limitations of cardiopulmonary resuscitation.
- 04.0 Demonstrate the use of hardware and fasteners, basic tools and equipment--The student will be able to:
- 04.01 Identify and use the following correctly and safely:
    - a. Basic hand tools
    - b. Basic welding tools and equipment
    - c. Power tools

- d. Measuring and precision tools.
  - e. Basic and specialty hardware and fasteners.
- 04.02 Read a digital multimeter.
- 05.0 Demonstrate workplace communication skills--The student will be able to:
- 05.01 Locate information in technical literature, such as a manufacturer's manual, in both print and computer versions.
  - 05.02 Read, interpret, and apply information from parts and service manuals.
  - 05.03 Read and follow written and oral instructions.
  - 05.04 Read and interpret graphs, charts, diagrams, and tables commonly used in the diesel technology industry.
  - 05.05 Answer and ask questions coherently and concisely.
  - 05.06 Use basic keyboarding and computer skills.
  - 05.07 Use industry-related computer software.
  - 05.08 Interpret technical specification information and diagnose problems, both verbally and in writing.
  - 05.09 Solve basic transit technology problems by combining knowledge of transit systems with technical information and diagnostic data.
  - 05.10 Complete accurately the required information for journals, repair orders, invoices, time cards, job sheets, and forms.
  - 05.11 Demonstrate telephone and interpersonal communication skills to accurately and courteously exchange information with customers, co-worker, and supervisors.
- 06.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 06.01 Comply with safety regulations for all preventive maintenance technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 06.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 07.0 Perform transit bus and forklift preventive maintenance--The student will be able to:
- 07.01 Identify the types of preventive maintenance, including oil analysis, required for components and systems, according to manufacturer and company specifications.
  - 07.02 Schedule preventive-maintenance inspections at the miles and/or times required by manufacturer and company specifications.
  - 07.03 Perform preventive maintenance inspections and record results according to manufacturer and company specifications, including:
    - a. Air, parking, and anti-locking brake systems.
    - b. Wheels, bearings, hubs, and tires.
    - c. Heating and air-conditioning components, refrigerants, and system operations.
    - d. Hydraulic systems, including fluids, filters, lines, and reservoirs.
    - e. Tires, suspension, and drive train.
    - f. Other interior and exterior items as indicated on the Preventive Maintenance Work Order/Checklist.

- 07.04 Test-drive equipment, where liability and safety allow such tests, and identify needed repairs.
- 08.0 Perform tire service, identification, and repair--The student will be able to:
  - 08.01 Identify the types of tires, wheels, tread depth measurement, and sidewall inspection criteria.
  - 08.02 Understand relationship between tire size and speedometer, odometer, hubometer.
  - 08.03 Identify different wear indicator patterns and relationship to defective components.
- 09.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
  - 09.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 09.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 09.03 Construct charts/tables/graphs using functions and data. AF3.5
- 10.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
  - 10.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 10.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 11.0 Demonstrate the qualifications for employment--The student will be able to:
  - 11.01 Demonstrate shop organization, management, and safety requirements for a preventive maintenance technician.
  - 11.02 Demonstrate the use of tools and equipment required for a preventive maintenance technician.
  - 11.03 Demonstrate workplace communication skills required by a preventive maintenance technician.
  - 11.04 Demonstrate the application of math and science principles required for a preventive maintenance technician's job tasks.
  - 11.05 Identify and demonstrate work habits of successful employees concerning:
    - a. Quality of work
    - b. Work hours and schedule
    - c. Actions, initiative, teamwork, dependability, and responsible decision making
    - d. Self-control, responses to criticism, and relationships with customers and supervisors
    - e. Time management, cost effectiveness, and fair pricing
    - f. Personal hygiene, health habits, and professional appearance
    - g. Driving records, drug-free workplace, and industry policies
  - 11.06 Obtain information about training and licensing requirements, equipment needs, responsibilities, pay, benefits, work conditions, risks, and opportunities for advancement.
  - 11.07 Demonstrate knowledge of the "Right-to-Know" law, as recorded in (29 CFR 1910.1200)



11.08 Demonstrate employability skills as a transit bus preventive maintenance technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title: Transit Bus Service 2**

**Course Number: 9500120**

**Course Credit: 1**

**Course Description:**

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus basic electrical systems and components, and demonstrating the qualifications for employment.

12.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 12.01 Comply with safety regulations for all basic electrical technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 12.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

13.0 Maintain and repair transit bus basic electrical systems and components --The student will be able to:

- 13.01 Explain the theory and nature of electricity.
- 13.02 Understand basic electrical terminology and symbols.
- 13.03 Analyze electrical circuits.
- 13.04 Work problems using Ohm's and Kirchoff's laws.
- 13.05 Understand circuit characteristics: series, parallel, open, short.
- 13.06 Explain the principals of relays and transistors.
- 13.07 Understand mystery harness application.
- 13.08 Explain magnetism and electromagnetic induction.
- 13.09 Explain applications of alternating current (AC).
- 13.10 Explain principles of direct current (DC) motors and generators.
- 13.11 Explain principles of AC motors.
- 13.12 Locate and match electrical units by their symbols on a wiring diagram.
- 13.13 Set up and use voltmeters, ammeters, and ohmmeters.

14.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0

- 14.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
- 14.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 14.03 Present information formally and informally for specific purposes and audiences.AF2.9

- 15.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 15.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 15.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 15.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 15.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 16.0 Demonstrate the qualifications for employment--The student will be able to:
- 16.01 Demonstrate shop organization, management, and safety requirements for a basic electrical systems technician.
  - 16.02 Demonstrate the use of tools and equipment required for a basic electrical systems technician.
  - 16.03 Demonstrate workplace communication skills required by a basic electrical systems technician.
  - 16.04 Demonstrate the application of math and science principles required for a basic electrical systems technician's job tasks.
  - 16.05 Demonstrate employability skills as a transit bus basic electrical systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title: Transit Bus Service 3**

**Course Number: 9500130**

**Course Credit: 1**

**Course Description:**

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus wheelchair lift and ramp systems and components, and demonstrating the qualifications for employment.

- 17.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 17.01 Comply with safety regulations for all wheelchair lift and ramp activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 17.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 18.0 Maintain and repair transit bus wheelchair lift/ramp systems and components--The student will be able to:
- 18.01 Troubleshoot and repair the following:
  - 18.02 Wheelchair lift, pumps, hoses, and components
  - 18.03 Wheelchair ramp and associated hardware
  - 18.04 Troubleshoot and repair kneeler faults and components.
  - 18.05 Troubleshoot and repair lift hydraulic/electrical system.
- 19.0 Use information technology tools. -- The students will be able to:
- 19.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 19.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 19.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 19.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 20.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 20.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0

- 20.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 20.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 20.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 21.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 21.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 21.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 21.03 Develop a personal budget and financial goals. FL3.1
  - 21.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 21.05 Maintain financial records. FL3.3
  - 21.06 Read and reconcile financial statements. FL3.4
  - 21.07 Research, compare and contrast investment opportunities.
- 22.0 Demonstrate the qualifications for employment--The student will be able to:
- 22.01 Demonstrate shop organization, management, and safety requirements for a wheelchair lift/ramp systems technician.
  - 22.02 Demonstrate the use of tools and equipment required for a wheelchair lift/ramp systems technician.
  - 22.03 Demonstrate workplace communication skills required by a wheelchair lift/ramp systems technician.
  - 22.04 Demonstrate the application of math and science principles required for a wheelchair lift/ramp systems technician's job tasks.
  - 22.05 Demonstrate employability skills as a transit bus wheelchair lift/ramp systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title: Transit Bus Service 4**

**Course Number: 9500140**

**Course Credit: 1**

**Course Description:**

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, performing diesel engine preventive maintenance, and demonstrating the qualifications for employment.

- 23.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 23.01 Comply with safety regulations for all diesel engine technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 23.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 24.0 Perform diesel engine preventive maintenance--The student will be able to:
- 24.01 Identify types of bearings and their uses.
  - 24.02 Identify seals, gaskets, and fasteners.
  - 24.03 Identify drive power train components and functions.
  - 24.04 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility.
  - 24.05 Identify the types of preventive maintenance, including oil analysis, required for components and systems, according to manufacturer and company specifications.
  - 24.06 Schedule preventive-maintenance inspections at the miles and/or times required by manufacturer and company specifications.
  - 24.07 Perform preventive-maintenance inspections and record results according to manufacturer and company specifications.
  - 24.08 Demonstrate the ability to remove correctly an oil sample for analysis.
- 25.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 25.01 Describe the nature and types of business organizations. SY 1.0
  - 25.02 Explain the effect of key organizational systems on performance and quality.
  - 25.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 25.04 Explain the impact of the global economy on business organizations.

26.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 26.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 26.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 26.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 26.04 Employ mentoring skills to inspire and teach others. LT 5.0

27.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 27.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 27.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 27.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 27.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 27.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 27.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 27.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 27.08 Research the benefits of ongoing professional development. ECD 9.0
- 27.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

28.0 Demonstrate the qualifications for employment--The student will be able to:

- 28.01 Demonstrate shop organization, management, and safety.
- 28.02 Demonstrate the use of tools and equipment required for a diesel engine technician.
- 28.03 Demonstrate workplace communication skills required by a diesel engine technician.
- 28.04 Demonstrate the application of math and science principles required for a diesel engine technician's job tasks.
- 28.05 Demonstrate employability skills as a transit diesel engine technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards****Course Title: Transit Bus Service 5****Course Number: 9500150****Course Credit: 1****Course Description:**

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus steering and suspension systems, and demonstrating the qualifications for employment.

29.0 Demonstrate shop and occupational safety procedures--The student will be able to:

29.01 Comply with safety regulations for all steering and suspension technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.

29.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

30.0 Maintain and repair steering and suspension systems--The student will be able to:

30.01 Troubleshoot and repair the following:

- a. Conventional steering systems
- b. Hydraulic steering systems
- c. Rear-axle suspensions
- d. Front-axle suspensions

30.02 Service wheels, bearings, hubs, and seals.

30.03 Service tires.

30.04 Align bus frame.

30.05 Adjust bus height.

31.0 Demonstrate the qualifications for employment--The student will be able to:

31.01 Demonstrate shop organization, management, and safety requirements for a steering and suspension technician.

31.02 Demonstrate the use of tools and equipment required for a steering and suspension technician.

31.03 Demonstrate workplace communication skills required by a steering and suspension maintenance technician.

31.04 Demonstrate the application of math and science principles required for a steering and suspension technician's job tasks.

31.05 Demonstrate employability skills as a transit bus steering and suspension maintenance technician.



2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Transit Technician 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	9500200	T660200
CIP Number	0647060508	0647060508
Grade Level	9-12, 30, 31	30, 31
Standard Length	5 Credits	620 Hours
Teacher Certification	DIESEL MECH @7 G	DIESEL MECH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3031	49-3031
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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 the following: maintaining and repairing diesel engines, maintaining and repairing hydraulic systems, maintaining and repairing electrical systems, maintaining and repairing heavy duty bus drive train systems and components, maintaining and repairing brake and air systems.

The course content will also include training in communication, leadership, human relations, transit safety awareness, MSDS, employability skills, and safe efficient work practices.

### Program Structure

This program is a planned sequence of instruction consisting of three programs of instruction consisting of 15 occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0820	Transit Hydraulics Technician	60	49-3031
B	DIM0821	Transit Diesel Electrical And Diesel Engine Electronics Technician	120	49-3031
C	DIM0822	Transit Drivetrain Technician	120	49-3031
D	DIM0823	Transit Intermediate Electrical Systems Technician	120	49-3031
E	DIM0824	Transit Brakes/Air System Technician	200	49-3031

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	9500210	Transit Bus Service 6	1 credit	49-3031	2
B	9500220	Transit Bus Service 7	1 credit	49-3031	2
C	9500230	Transit Bus Service 8	1 credit	49-3031	2
D	9500240	Transit Bus Service 9	1 credit	49-3031	2
E	9500250	Transit Bus Service 10	1 credit	49-3031	2

The safety guidelines in the student performance standards have been recommended in the ASE Program Certification Standards administered by the National Automotive Technicians Education Foundation (NATEF).

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these

occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for employment as transit technicians, train existing employees to become FTMC certified transit technicians and to prepare existing technicians for the ASE series of Transit Bus tests.

It is recommended that students complete the five OCP's for each technician level before advancing to the next tier. Transit technician 1 and 2 are prerequisites for the Transit Technician 3, and ultimately, the FTMC Transit Technician certification.

The courses may be taken in any sequence within their respective tier, but tiers must be taken sequentially, starting with tier 1, then tier 2, and ending with tier 3. Students must demonstrate proficiency in the preceding tier prior to advancement to the next higher tier.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Demonstrate shop and occupational safety procedures.
- 02.0 Maintain and repair transit bus hydraulic systems.
- 03.0 Demonstrate the qualifications for employment.
- 04.0 Demonstrate shop and occupational safety procedures.
- 05.0 Identify and apply electrical principles related to diesel technology.
- 06.0 Identify and apply electronic principles related to diesel technology.
- 07.0 Maintain and repair electrical systems.
- 08.0 Demonstrate the qualifications for employment.
- 09.0 Demonstrate shop and occupational safety procedures.
- 10.0 Maintain and repair transit bus power train systems and components.
- 11.0 Demonstrate the qualifications for employment.
- 12.0 Demonstrate shop and occupational safety procedures.
- 13.0 Maintain and repair transit bus intermediate electrical systems and components.
- 14.0 Demonstrate the qualifications for employment.
- 15.0 Demonstrate shop and occupational safety procedures.
- 16.0 Maintain and repair transit bus brake and air systems.
- 17.0 Demonstrate the qualifications for employment.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Transit Technician 2  
PSAV Number: T660200**

**Course Number: DIM0820  
Occupational Completion Point: A  
Transit Hydraulics Technician – 60 Hours – SOC Code 49-3031**

- 01.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 01.01 Comply with safety regulations for all hydraulic systems technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 01.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 02.0 Maintain and repair hydraulic system components--The student will be able to:
- 02.01 Explain the basic principles of hydraulics.
  - 02.02 Identify and explain the operating components of hydraulic systems.
  - 02.03 Locate and identify hydraulic units by their symbols on a diagram.
  - 02.04 Troubleshoot hydraulic circuits using test equipment.
  - 02.05 Maintain hydraulic fluids, filters, lines, and reservoirs.
  - 02.06 Recondition the following:
    - a. Hydraulic pumps and motors
    - b. Control valves
    - c. Hydraulic cylinders
    - d. Hydraulic accessories
- 03.0 Demonstrate the qualifications for employment--The student will be able to:
- 03.01 Demonstrate shop organization, management, and safety requirements for a hydraulic systems technician.
  - 03.02 Demonstrate the use of tools and equipment required for a hydraulic systems technician.
  - 03.03 Demonstrate workplace communication skills required by a hydraulic systems technician.
  - 03.04 Demonstrate the application of math and science principles required for a hydraulic maintenance technician's job tasks.
  - 03.05 Demonstrate employability skills as a transit bus hydraulic systems technician.

**Course Number: DIM0821  
Occupational Completion Point: B  
Transit Diesel Electrical and Diesel Engine Electronics Technician – 120 Hours – SOC Code 49-3031**

- 04.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 04.01 Comply with safety regulations for all diesel electrical and diesel engine electronics technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and the handling, storage, and disposal of chemicals and hazardous materials.
- 05.0 Identify and apply electrical principles related to diesel technology--The student will be able to:
- 05.01 Explain the nature of electricity.
  - 05.02 Analyze electrical circuits.
  - 05.03 Work problems using Ohm's and Kirchoff's laws.
  - 05.04 Explain magnetism and electromagnetic induction.
  - 05.05 Explain applications of alternating current (AC).
  - 05.06 Explain principles of direct current (DC) motors and generators.
  - 05.07 Explain principles of AC motors.
  - 05.08 Locate and match electrical units by their symbols on a wiring diagram.
  - 05.09 Set up and use voltmeters, ammeters, and ohmmeters.
- 06.0 Identify and apply electronic principles related to diesel technology--The student will be able to:
- 06.01 Explain the principles of diodes and rectifiers.
  - 06.02 Explain the principles of voltage regulation and power supply circuits.
  - 06.03 Explain the principles of transistors.
  - 06.04 Explain the principles of the silicon-controlled rectifier (SCR).
  - 06.05 Identify components of electronic systems and explain their functions.
- 07.0 Maintain and repair electrical systems--The student will be able to:
- 07.01 Test and service the following:
    - a. Batteries
    - b. Instruments and gauges
  - 07.02 Test and repair the following systems:
    - a. Starting
    - b. Charging
    - c. Ignition
    - d. Lighting and accessories
  - 07.03 Inspect, remove, clean, and install batteries and cables for parallel and/or series hookups.
  - 07.04 Install batteries correctly where two or more batteries are used.
  - 07.05 Identify, diagnose, remove and replace electronic sensors.
  - 07.06 Identify the methods for testing and repair of electronic governors.
- 08.0 Demonstrate the qualifications for employment--The student will be able to:
- 08.01 Demonstrate shop organization, management, and safety requirements for a diesel electrical and diesel engine electronics technician.

- 08.02 Demonstrate the use of tools and equipment required for a diesel electrical and diesel engine electronics technician.
- 08.03 Demonstrate workplace communication skills required by a diesel electrical and diesel engine electronics technician.
- 08.04 Demonstrate the application of math and science principles required for a diesel electrical and diesel engine electronics technician's job tasks.
- 08.05 Demonstrate employability skills as a diesel electrical and diesel engine electronics technician.

**Course Number: DIM0822**

**Occupational Completion Point: C**

**Transit Drivetrain Technician – 120 Hours – SOC Code 49-3031**

09.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 09.01 Comply with safety regulations for all drive-train technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 09.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

10.0 Maintain and repair transit bus power train systems and components--The student will be able to:

- 10.01 Explain power train operating principles and identify components.
- 10.02 Remove, replace, and adjust clutches.
- 10.03 Service and Repair automatic transmissions.
- 10.04 Troubleshoot power trains.
- 10.05 Troubleshoot transmission shift patterns
- 10.06 Service and repair differentials.
- 10.07 Identify and service the following:
  - a. Drivelines
  - b. Power takeoffs

11.0 Demonstrate the qualifications for employment--The student will be able to:

- 11.01 Demonstrate shop organization, management, and safety requirements for a drive-train technician.
- 11.02 Demonstrate the use of tools and equipment required for a drive-train technician.
- 11.03 Demonstrate workplace communication skills required by a drive-train technician.
- 11.04 Demonstrate the application of math and science principles required for a drive-train technician's job tasks.
- 11.05 Demonstrate employability skills as a transit bus drive-train systems technician.

**Course Number: DIM0823**

**Occupational Completion Point: D**

**Transit Intermediate Electrical Systems Technician – 120 Hours – SOC Code 49-3031**

12.0 Demonstrate shop and occupational safety procedures--The student will be able to:



- 12.01 Comply with safety regulations for all intermediate electrical systems technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 12.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 13.0 Maintain and repair transit bus intermediate electrical systems and components --The student will be able to:
- 13.01 Explain the principles of operation and purposes of transistors, relays, and switches found on transit equipment.
  - 13.02 Understand and explain the principle and design of Starter motor and solenoid.
  - 13.03 Understand the design and characteristics of generator, alternator, and battery equalizer
  - 13.04 Test and Trouble-shoot the following components:
    - 13.05 50 DN Generator
    - 13.06 Niehoff Generator
  - 13.07 Perform an Equalizer test and a Diode test.
  - 13.08 Analyze a Nova component and corresponding schematic.
  - 13.09 Build and diagnose electrical circuits utilizing the ATEC circuit simulation modules.
  - 13.10 Read and understand electrical schematics and charts.
- 14.0 Demonstrate the qualifications for employment--The student will be able to:
- 14.01 Demonstrate shop organization, management, and safety requirements for an intermediate electrical systems technician.
  - 14.02 Demonstrate the use of tools and equipment required for an intermediate electrical systems technician.
  - 14.03 Demonstrate workplace communication skills required by an intermediate electrical systems technician.
  - 14.04 Demonstrate the application of math and science principles required for an intermediate electrical systems technician's job tasks.
  - 14.05 Demonstrate employability skills as a transit bus intermediate electrical systems technician.

**Course Number: DIM0824**

**Occupational Completion Point: E**

**Transit Brakes/Air System Technician – 200 Hours – SOC Code 49-3031**

- 15.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 15.01 Comply with safety regulations for all transit brake and air system technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 15.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

16.0 Maintain and repair brake systems--The student will be able to:

- 16.01 Explain the principles and identify components of air brake systems.
- 16.02 Service and recondition air brake systems.
- 16.03 Identify the principles and components of the following brake systems.
  - a. Air
  - b. Parking
  - c. Anti-locking (ABS)
  - d. Wedge
  - e. S-Cam
- 16.04 Troubleshoot brake systems.
- 16.05 Service and recondition air brake systems.
- 16.06 Service and adjust air compressors and governors.
- 16.07 Service and recondition parking brakes.
- 16.08 Troubleshoot and service hydraulic booster.
- 16.09 Remove, inspect, repair, and replace brake pads, shoes, linings, cams, cam bearings, springs, brake air chambers, drums, and rotors.
- 16.10 Troubleshoot and service air system valves, tanks, lines, and fittings.
- 16.11 Troubleshoot brake and air system utilizing air brake board.

17.0 Demonstrate the qualifications for employment--The student will be able to:

- 17.01 Demonstrate shop organization, management, and safety requirements for a transit brake and air system technician.
- 17.02 Demonstrate the use of tools and equipment required for a transit brake and air system technician.
- 17.03 Demonstrate workplace communication skills required by a transit brake and air system technician.
- 17.04 Demonstrate the application of math and science principles required for a transit brake and air system technician's job tasks.
- 17.05 Demonstrate employability skills as a transit brake and air system technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 6  
**Course Number:** 9500210  
**Course Credit:** 1

**Course Description:**

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus hydraulic systems, and demonstrating the qualifications for employment.

- 01.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 01.01 Comply with safety regulations for all hydraulic systems technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 01.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 02.0 Maintain and repair hydraulic system components--The student will be able to:
- 02.01 Explain the basic principles of hydraulics.
  - 02.02 Identify and explain the operating components of hydraulic systems.
  - 02.03 Locate and identify hydraulic units by their symbols on a diagram.
  - 02.04 Troubleshoot hydraulic circuits using test equipment.
  - 02.05 Maintain hydraulic fluids, filters, lines, and reservoirs.
  - 02.06 Recondition the following:
    - a. Hydraulic pumps and motors
    - b. Control valves
    - c. Hydraulic cylinders
    - d. Hydraulic accessories
- 03.0 Demonstrate the qualifications for employment--The student will be able to:
- 03.01 Demonstrate shop organization, management, and safety requirements for a hydraulic systems technician.
  - 03.02 Demonstrate the use of tools and equipment required for a hydraulic systems technician.
  - 03.03 Demonstrate workplace communication skills required by a hydraulic systems technician.
  - 03.04 Demonstrate the application of math and science principles required for a hydraulic maintenance technician's job tasks.
  - 03.05 Demonstrate employability skills as a transit bus hydraulic systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 7  
**Course Number:** 9500220  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, identifying and applying electrical principles related to diesel technology, identifying and applying electronic principles related to diesel technology, maintaining and repairing electrical systems, and demonstrating the qualifications for employment.

- 04.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 04.01 Comply with safety regulations for all diesel electrical and diesel engine electronics technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and the handling, storage, and disposal of chemicals and hazardous materials.
- 05.0 Identify and apply electrical principles related to diesel technology--The student will be able to:
- 05.01 Explain the nature of electricity.
  - 05.02 Analyze electrical circuits.
  - 05.03 Work problems using Ohm's and Kirchoff's laws.
  - 05.04 Explain magnetism and electromagnetic induction.
  - 05.05 Explain applications of alternating current (AC).
  - 05.06 Explain principles of direct current (DC) motors and generators.
  - 05.07 Explain principles of AC motors.
  - 05.08 Locate and match electrical units by their symbols on a wiring diagram.
  - 05.09 Set up and use voltmeters, ammeters, and ohmmeters.
- 06.0 Identify and apply electronic principles related to diesel technology--The student will be able to:
- 06.01 Explain the principles of diodes and rectifiers.
  - 06.02 Explain the principles of voltage regulation and power supply circuits.
  - 06.03 Explain the principles of transistors.
  - 06.04 Explain the principles of the silicon-controlled rectifier (SCR).
  - 06.05 Identify components of electronic systems and explain their functions.
- 07.0 Maintain and repair electrical systems--The student will be able to:
- 07.01 Test and service the following:

- a. Batteries
- b. Instruments and gauges
- 07.02 Test and repair the following systems:
  - a. Starting
  - b. Charging
  - c. Ignition
  - d. Lighting and accessories
- 07.03 Inspect, remove, clean, and install batteries and cables for parallel and/or series hookups.
- 07.04 Install batteries correctly where two or more batteries are used.
- 07.05 Identify, diagnose, remove and replace electronic sensors.
- 07.06 Identify the methods for testing and repair of electronic governors.
- 08.0 Demonstrate the qualifications for employment--The student will be able to:
  - 08.01 Demonstrate shop organization, management, and safety requirements for a diesel electrical and diesel engine electronics technician.
  - 08.02 Demonstrate the use of tools and equipment required for a diesel electrical and diesel engine electronics technician.
  - 08.03 Demonstrate workplace communication skills required by a diesel electrical and diesel engine electronics technician.
  - 08.04 Demonstrate the application of math and science principles required for a diesel electrical and diesel engine electronics technician's job tasks.
  - 08.05 Demonstrate employability skills as a diesel electrical and diesel engine electronics technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 8  
**Course Number:** 9500230  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus power train systems and components, and demonstrating the qualifications for employment.

09.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 09.01 Comply with safety regulations for all drive-train technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 09.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

10.0 Maintain and repair transit bus power train systems and components--The student will be able to:

- 10.01 Explain power train operating principles and identify components.
- 10.02 Remove, replace, and adjust clutches.
- 10.03 Service and Repair automatic transmissions.
- 10.04 Troubleshoot power trains.
- 10.05 Troubleshoot transmission shift patterns
- 10.06 Service and repair differentials.
- 10.07 Identify and service the following:
  - a. Drivelines
  - b. Power takeoffs

11.0 Demonstrate the qualifications for employment--The student will be able to:

- 11.01 Demonstrate shop organization, management, and safety requirements for a drive-train technician.
- 11.02 Demonstrate the use of tools and equipment required for a drive-train technician.
- 11.03 Demonstrate workplace communication skills required by a drive-train technician.
- 11.04 Demonstrate the application of math and science principles required for a drive-train technician's job tasks.
- 11.05 Demonstrate employability skills as a transit bus drive-train systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 9  
**Course Number:** 9500240  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus intermediate electrical systems and components, and demonstrating the qualifications for employment.

12.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 12.01 Comply with safety regulations for all intermediate electrical systems technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 12.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

13.0 Maintain and repair transit bus intermediate electrical systems and components --The student will be able to:

- 13.01 Explain the principles of operation and purposes of transistors, relays, and switches found on transit equipment.
- 13.02 Understand and explain the principle and design of Starter motor and solenoid.
- 13.03 Understand the design and characteristics of generator, alternator, and battery equalizer
- 13.04 Test and Trouble-shoot the following components:
  - a. 50 DN Generator
  - b. Niehoff Generator
- 13.05 Perform an Equalizer test and a Diode test.
- 13.06 Analyze a Nova component and corresponding schematic.
- 13.07 Build and diagnose electrical circuits utilizing the ATEC circuit simulation modules.
- 13.08 Read and understand electrical schematics and charts.

14.0 Demonstrate the qualifications for employment--The student will be able to:

- 14.01 Demonstrate shop organization, management, and safety requirements for an intermediate electrical systems technician.
- 14.02 Demonstrate the use of tools and equipment required for an intermediate electrical systems technician.
- 14.03 Demonstrate workplace communication skills required by an intermediate electrical systems technician.

- 14.04 Demonstrate the application of math and science principles required for an intermediate electrical systems technician's job tasks.
- 14.05 Demonstrate employability skills as a transit bus intermediate electrical systems technician.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 10  
**Course Number:** 9500250  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus brake and air systems, and demonstrating the qualifications for employment.

15.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 15.01 Comply with safety regulations for all transit brake and air system technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 15.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

16.0 Maintain and repair brake systems--The student will be able to:

- 16.01 Explain the principles and identify components of air brake systems.
- 16.02 Service and recondition air brake systems.
- 16.03 Identify the principles and components of the following brake systems.
  - a. Air
  - b. Parking
  - c. Anti-locking (ABS)
  - d. Wedge
  - e. S-Cam
- 16.04 Troubleshoot brake systems.
- 16.05 Service and recondition air brake systems.
- 16.06 Service and adjust air compressors and governors.
- 16.07 Service and recondition parking brakes.
- 16.08 Troubleshoot and service hydraulic booster.
- 16.09 Remove, inspect, repair, and replace brake pads, shoes, linings, cams, cam bearings, springs, brake air chambers, drums, and rotors.
- 16.10 Troubleshoot and service air system valves, tanks, lines, and fittings.
- 16.11 Troubleshoot brake and air system utilizing air brake board.

17.0 Demonstrate the qualifications for employment--The student will be able to:

- 17.01 Demonstrate shop organization, management, and safety requirements for a transit brake and air system technician.
- 17.02 Demonstrate the use of tools and equipment required for a transit brake and air system technician.

- 17.03 Demonstrate workplace communication skills required by a transit brake and air system technician.
- 17.04 Demonstrate the application of math and science principles required for a transit brake and air system technician's job tasks.
- 17.05 Demonstrate employability skills as a transit brake and air system technician.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Transit Technician 3  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	Secondary	PSAV
Program Number	9500300	T660300
CIP Number	0647060509	0647060509
Grade Level	9-12, 30, 31	30, 31
Standard Length	5 Credits	680 Hours
Teacher Certification	DIESEL MECH @7 G	DIESEL MECH @7 G
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	49-3031	49-3031
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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 the following: maintaining and repairing diesel engines, maintaining and repairing transmission and cooling systems, maintaining and repairing digital multiplex electrical systems, overhauling diesel engines and bus transmissions, maintaining and repairing heavy duty (10 ton) A/C systems and components, maintaining and repairing

alternative fuel vehicles and components, and troubleshooting, maintaining, and repairing electronic computer controls and sensors and advanced electrical systems.

The course content will also include training in communication, leadership, human relations, transit safety awareness, MSDS, employability skills, and safe efficient work practices.

### Program Structure

This program is a planned sequence of instruction consisting of three programs of instruction consisting of 15 occupational completion points. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training program or terminate as an occupational completer.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0830	Transit Alternative Fuels System Technician	120	49-3031
B	DIM0831	Transit Advanced Electrical Systems Technician	120	49-3031
C	DIM0832	Transit Heating And Air-Conditioning Technician	200	49-3031
D	DIM0833	Transmission Diagnosis, Rebuild And Repair Technician	120	49-3031
E	DIM0834	Diesel Engine Diagnosis, Rebuild And Repair Technician	120	49-3031

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	9500310	Transit Bus Service 11	1 credit	49-3031	2
B	9500320	Transit Bus Service 12	1 credit	49-3031	2
C	9500330	Transit Bus Service 13	1 credit	49-3031	2
D	9500340	Transit Bus Service 14	1 credit	49-3031	2
E	9500350	Transit Bus Service 15	1 credit	49-3031	2

The safety guidelines in the student performance standards have been recommended in the ASE Program Certification Standards administered by the National Automotive Technicians Education Foundation (NATEF).

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

The purpose of this program is to prepare students for employment as transit technicians, train existing employees to become FTMC certified transit technicians and to prepare existing technicians for the ASE series of Transit Bus tests.

It is recommended that students complete the five OCP's for each technician level before advancing to the next tier. Transit technician 1 and 2 are prerequisites for the Transit Technician 3, and ultimately, the FTMC Transit Technician certification.

The courses may be taken in any sequence within their respective tier, but tiers must be taken sequentially, starting with tier 1, then tier 2, and ending with tier 3. Student must demonstrate proficiency in the preceding tier prior to advancement to the next higher tier.

## **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Demonstrate shop and occupational safety procedures.
- 02.0 Maintain and repair transit bus alternative fuels systems and components.
- 03.0 Demonstrate the qualifications for employment.
- 04.0 Demonstrate shop and occupational safety procedures.
- 05.0 Maintain and repair transit bus advanced electrical systems and components.
- 06.0 Demonstrate the qualifications for employment.
- 07.0 Demonstrate shop and occupational safety procedures.
- 08.0 Maintain and repair transit bus heating and air-conditioning systems.
- 09.0 Demonstrate the qualifications for employment.
- 10.0 Demonstrate shop and occupational safety procedures.
- 11.0 Maintain, diagnose, repair, and rebuild transit bus transmission assemblies.
- 12.0 Demonstrate the qualifications for employment.
- 13.0 Demonstrate shop and occupational safety procedures.
- 14.0 Identify principles, assemblies, and systems of engine operation.
- 15.0 Apply math skills to diesel technology tasks.
- 16.0 Apply scientific principles common to diesel technology operations.
- 17.0 Troubleshoot and repair engine systems.
- 18.0 Rebuild a cylinder-head assembly.
- 19.0 Remove and replace camshaft assemblies.
- 20.0 Rebuild a block assembly.
- 21.0 Demonstrate the qualifications for employment.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Transit Technician 3**

**PSAV Number: T660300**

**Course Number: DIM0830**

**Occupational Completion Point: A**

**Transit Alternative Fuels System Technician – 120 Hours – SOC Code 49-3031**

- 01.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 01.01 Comply with safety regulations for all alternative fuels system technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 01.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 02.0 Maintain and repair alternative fuels systems--The student will be able to:
- 02.01 Troubleshoot and diagnose the following:
    - a. ESS Energy Storage System
    - b. DPIM Dual Power Inverter Module
    - c. TCM/VCM
  - 02.02 Identify and understand torque blending.
  - 02.03 Identify and understand Fuel Cells, ULSD, PC-10 and CJ-4 Oils.
  - 02.04 Identify and understand the characteristics and limitations of Bio-diesel, CNG, E85 Ethanol, and EP40 hybrid-electric.
- 03.0 Demonstrate the qualifications for employment--The student will be able to:
- 03.01 Demonstrate shop organization, management, and safety requirements for an alternative fuels systems technician.
  - 03.02 Demonstrate the use of tools and equipment required for an alternative fuels systems technician.
  - 03.03 Demonstrate workplace communication skills required by an alternative fuels systems technician.
  - 03.04 Demonstrate the application of math and science principles required for an alternative fuels systems technician's job tasks.
  - 03.05 Demonstrate employability skills as a transit bus alternative fuels systems technician.

**Course Number: DIM0831**

**Occupational Completion Point: B**

**Transit Advanced Electrical Systems Technician – 120 Hours – SOC Code 49-3031**

- 04.0 Demonstrate shop and occupational safety procedures--The student will be able to:



- 04.01 Comply with safety regulations for all advanced electrical system technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 05.0 Maintain and repair transit bus advanced electrical systems and components--The student will be able to:
- 05.01 Build and diagnose electrical circuits utilizing the ATEC circuit simulation modules.
  - 05.02 Understand Programmable logic controller (PLC), Multiplex system and its components, Ladder logic / chart, various electrical instruments, and various types of sensors.
  - 05.03 Identify and troubleshoot multiplex electrical system and components.
  - 05.04 Read and understand complex electrical schematics and charts.
- 06.0 Demonstrate the qualifications for employment--The student will be able to:
- 06.01 Demonstrate shop organization, management, and safety requirements for an advanced electrical systems technician.
  - 06.02 Demonstrate the use of tools and equipment required for an advanced electrical systems technician.
  - 06.03 Demonstrate workplace communication skills required by an advanced electrical systems technician.
  - 06.04 Demonstrate the application of math and science principles required for an advanced electrical systems technician's job tasks.
  - 06.05 Demonstrate employability skills as a transit bus advanced electrical systems technician.

**Course Number: DIM0832**

**Occupational Completion Point: C**

**Transit Heating and Air-Conditioning Technician – 200 Hours – SOC Code 49-3031**

- 07.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 07.01 Comply with safety regulations for all transit heating and air conditioning systems technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 07.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 08.0 Maintain and repair air-conditioning and heating systems--The student will be able to:
- 08.01 Identify basic heating and air-conditioning components.
  - 08.02 Identify different types of refrigerants.
  - 08.03 Describe EPA requirements for handling recycled refrigerants.
  - 08.04 Demonstrate the use of recovery and reclaim systems.
  - 08.05 Inspect and pressure tests a basic air-conditioning (AC) system.

- 08.06 Inspect, remove, and replace compressor belts.
- 08.07 Leak-test a basic AC system.
- 08.08 Evaluate and charge a basic AC system using recovery equipment.
- 08.09 Service AC electrical circuits.
- 08.10 Service vacuum circuits.
- 08.11 Diagnose basic AC system problems.
- 08.12 Remove and replace components in basic AC systems.
- 08.13 Remove, repair, and replace engine fan clutches and controls.
- 08.14 Remove and replace blower motors.
- 08.15 Diagnose heater malfunctions.
- 08.16 Remove and replace heater cores, control units, and cables.
- 08.17 Obtain 608 certification.

09.0 Demonstrate the qualifications for employment--The student will be able to:

- 09.01 Demonstrate shop organization, management, and safety requirements for a transit heating and air conditioning systems technician.
- 09.02 Demonstrate the use of tools and equipment required for a transit heating and air conditioning systems technician.
- 09.03 Demonstrate workplace communication skills required by a transit heating and air conditioning systems technician.
- 09.04 Demonstrate the application of math and science principles required for a transit heating and air conditioning systems technician's job tasks.
- 09.05 Demonstrate employability skills as a transit bus heating and air conditioning systems technician.

**Course Number: DIM0833**

**Occupational Completion Point: D**

**Transmission Diagnosis, Rebuild and Repair Technician – 120 Hours – SOC Code 49-3031**

10.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 10.01 Comply with safety regulations for all transmission diagnosis, rebuild and repair technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 10.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

11.0 Maintain, diagnose, repair, and rebuild transit bus transmission assemblies--The student will be able to:

- 11.01 Identify the basic transmission components and functions.
- 11.02 Apply scientific principles common to transmission technology operations.
- 11.03 Identify principles of operation, assemblies, and systems of transmission operation.
- 11.04 Troubleshoot and repair transmission systems.
- 11.05 Rebuild transmission assemblies.
- 11.06 Remove and replace transmission assemblies.
- 11.07 Rebuild/troubleshoot retarder assembly.

- 12.0 Demonstrate the qualifications for employment--The student will be able to:
- 12.01 Demonstrate shop organization, management, and safety requirements for a transit transmission diagnosis, rebuild and repair technician.
  - 12.02 Demonstrate the use of tools and equipment required for a transit transmission diagnosis, rebuild and repair technician.
  - 12.03 Demonstrate workplace communication skills required by a transit transmission diagnosis, rebuild and repair technician.
  - 12.04 Demonstrate the application of math and science principles required for a transit transmission diagnosis, rebuild and repair technician's job tasks.
  - 12.05 Demonstrate employability skills as a transit bus transmission diagnosis, rebuild and repair technician.

**Course: DIM0834**

**Occupational Completion Point - Data Code – E**

**Diesel Engine Diagnosis, Rebuild and Repair Technician**

- 13.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 13.01 Comply with safety regulations for all diesel engine diagnosis, rebuild and repair technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 13.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 14.0 Identify principles, assemblies, and systems of engine operation--The student will be able to:
- 14.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine.
  - 14.02 Identify engine assemblies and systems.
  - 14.03 Explain the operating principles of two-and four-stroke cycle engines.
  - 14.04 Identify the components of two-and four-stroke-cycle engines.
  - 14.05 Identify governor types and explain their operating principles.
- 15.0 Apply math skills to diesel technology tasks--The student will be able to:
- 15.01 Apply math skills commonly required for performing job duties in diesel technology occupations.
    - a. Recognize, identify, and make metric conversions.
    - b. Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
    - c. Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
    - d. Add, subtract, multiply, and divide using fractions, decimals, and whole numbers.
  - 15.02 Determine the correct purchase price, including sales tax, for a materials list containing a minimum of six items.
  - 15.03 Calculate federal, state, and local taxes.

- 15.04 Explain industry time standards, including the use of flat-rate information.
- 16.0 Apply scientific principles common to diesel technology operations--The student will be able to:
  - 16.01 Explain molecular action caused by temperature extremes, chemical reaction, and moisture content.
  - 16.02 Interpret and draw reasonable conclusions from information provided in graphs, scales, and gauges.
  - 16.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 16.04 Read and interpret pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and kilopascal (KPA).
- 17.0 Troubleshoot and repair engine systems--The student will be able to:
  - 17.01 Troubleshoot and repair cooling systems.
  - 17.02 Troubleshoot and repair lubrication systems.
  - 17.03 Troubleshoot and repair induction and exhaust systems.
  - 17.04 Troubleshoot and repair diesel fuel-injection systems and components.
    - a. Inspect for operation and condition of the parts and systems, including fuel quality and consumption, safety shut-down devices, circuits, sensors, electronic governors, and flywheel.
    - b. Prime and bleed fuel-injection system.
    - c. Remove, test, and adjust injectors and nozzles.
    - d. Troubleshoot mechanical governors.
    - e. Remove, repair, and replace individual components as needed.
- 18.0 Rebuild a cylinder-head assembly--The student will be able to:
  - 18.01 Diagnose valve and head problems using the visual inspection method.
  - 18.02 Diagnose valve and head problems using the compression-tester or cylinder air-pressure method.
  - 18.03 Diagnose valve and head problems using the stethoscope method.
  - 18.04 Disassemble engines.
  - 18.05 Clean and inspect the heads for cracks, warping, and injector sleeves.
  - 18.06 Inspect the valve seat and check for warping, burns, cracks, and stem and tip wear.
  - 18.07 Grinds valve seats and reface valves.
  - 18.08 Check and inspect springs for free height, distortion, and installed height.
  - 18.09 Adjust the valve lash.
- 19.0 Remove and replace camshaft assemblies--The student will be able to:
  - 19.01 Remove and inspect camshaft bearings and lifters.
  - 19.02 Time valve-drive assemblies.
- 20.0 Rebuild a block assembly--The student will be able to:
  - 20.01 Remove the pistons from the rod assemblies.

- 20.02 Measure out-of-round and cylinder taper using a dial bore gauge or micrometer.
  - 20.03 Check the piston pins and boss for wear.
  - 20.04 Measure the piston ring lands width, out-of-round, and taper.
  - 20.05 Measure the piston ring gap in a cylinder bore.
  - 20.06 Install and fit the piston pins.
  - 20.07 Check the rod-and-piston assembly alignment.
  - 20.08 Remove and replace the rod bearings.
  - 20.09 Hone and clean the cylinders.
  - 20.10 Install rings on the pistons.
  - 20.11 Measure and check the crankshafts with a micrometer.
  - 20.12 Check the bearing bore with a telescope gauge.
  - 20.13 Reassemble engines using a plastic gauge.
  - 20.14 Install oil seals.
  - 20.15 Check for end play.
- 21.0 Demonstrate the qualifications for employment --The student will be able to:
- 21.01 Demonstrate shop organization, management, and safety requirements for a transit diesel engine diagnosis, rebuild and repair technician.
  - 21.02 Demonstrate the use of tools and equipment required for a transit diesel engine diagnosis, rebuild and repair technician.
  - 21.03 Demonstrate workplace communication skills required by a transit diesel engine diagnosis, rebuild and repair technician.
  - 21.04 Demonstrate the application of math and science principles required for a transit diesel engine diagnosis, rebuild and repair technician's job tasks.
  - 21.05 Demonstrate employability skills as a transit bus diesel engine diagnosis, rebuild and repair technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 11  
**Course Number:** 9500310  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus alternative fuels systems and components, and demonstrating the qualifications for employment.

- 01.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 01.01 Comply with safety regulations for all alternative fuels system technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 01.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 02.0 Maintain and repair alternative fuels systems--The student will be able to:
- 02.01 Troubleshoot and diagnose the following:
    - a. ESS Energy Storage System
    - b. DPIM Dual Power Inverter Module
    - c. TCM/VCM
  - 02.02 Identify and understand torque blending.
  - 02.03 Identify and understand Fuel Cells, ULSD, PC-10 and CJ-4 Oils.
  - 02.04 Identify and understand the characteristics and limitations of Bio-diesel, CNG, E85 Ethanol, and EP40 hybrid-electric.
- 03.0 Demonstrate the qualifications for employment--The student will be able to:
- 03.01 Demonstrate shop organization, management, and safety requirements for an alternative fuels systems technician.
  - 03.02 Demonstrate the use of tools and equipment required for an alternative fuels systems technician.
  - 03.03 Demonstrate workplace communication skills required by an alternative fuels systems technician.
  - 03.04 Demonstrate the application of math and science principles required for an alternative fuels systems technician's job tasks.
  - 03.05 Demonstrate employability skills as a transit bus alternative fuels systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 12  
**Course Number:** 9500320  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus advanced electrical systems and components, and demonstrating the qualifications for employment.

- 04.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 04.01 Comply with safety regulations for all advanced electrical system technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 05.0 Maintain and repair transit bus advanced electrical systems and components--The student will be able to:
- 05.01 Build and diagnose electrical circuits utilizing the ATEC circuit simulation modules.
  - 05.02 Understand Programmable logic controller (PLC), Multiplex system and its components, Ladder logic / chart, various electrical instruments, and various types of sensors.
  - 05.03 Identify and troubleshoot multiplex electrical system and components.
  - 05.04 Read and understand complex electrical schematics and charts.
- 06.0 Demonstrate the qualifications for employment--The student will be able to:
- 06.01 Demonstrate shop organization, management, and safety requirements for an advanced electrical systems technician.
  - 06.02 Demonstrate the use of tools and equipment required for an advanced electrical systems technician.
  - 06.03 Demonstrate workplace communication skills required by an advanced electrical systems technician.
  - 06.04 Demonstrate the application of math and science principles required for an advanced electrical systems technician's job tasks.
  - 06.05 Demonstrate employability skills as a transit bus advanced electrical systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 13  
**Course Number:** 9500330  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining and repairing transit bus heating and air-conditioning systems, and demonstrating the qualifications for employment.

07.0 Demonstrate shop and occupational safety procedures--The student will be able to:

- 07.01 Comply with safety regulations for all transit heating and air conditioning systems technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
- 07.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.

08.0 Maintain and repair air-conditioning and heating systems--The student will be able to:

- 08.01 Identify basic heating and air-conditioning components.
- 08.02 Identify different types of refrigerants.
- 08.03 Describe EPA requirements for handling recycled refrigerants.
- 08.04 Demonstrate the use of recovery and reclaim systems.
- 08.05 Inspect and pressure tests a basic air-conditioning (AC) system.
- 08.06 Inspect, remove, and replace compressor belts.
- 08.07 Leak-test a basic AC system.
- 08.08 Evaluate and charge a basic AC system using recovery equipment.
- 08.09 Service AC electrical circuits.
- 08.10 Service vacuum circuits.
- 08.11 Diagnose basic AC system problems.
- 08.12 Remove and replace components in basic AC systems.
- 08.13 Remove, repair, and replace engine fan clutches and controls.
- 08.14 Remove and replace blower motors.
- 08.15 Diagnose heater malfunctions.
- 08.16 Remove and replace heater cores, control units, and cables.
- 08.17 Pass the 608 A/C qualifications test.

09.0 Demonstrate the qualifications for employment--The student will be able to:

- 09.01 Demonstrate shop organization, management, and safety requirements for a transit heating and air conditioning systems technician.
- 09.02 Demonstrate the use of tools and equipment required for a transit heating and air conditioning systems technician.



- 09.03 Demonstrate workplace communication skills required by a transit heating and air conditioning systems technician.
- 09.04 Demonstrate the application of math and science principles required for a transit heating and air conditioning systems technician's job tasks.
- 09.05 Demonstrate employability skills as a transit bus heating and air conditioning systems technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 14  
**Course Number:** 9500340  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, maintaining, diagnosing, repairing, and rebuilding transit bus transmission assemblies, and demonstrating the qualifications for employment.

- 10.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 10.01 Comply with safety regulations for all transmission diagnosis, rebuild and repair technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 10.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 11.0 Maintain, diagnose, repair, and rebuild transit bus transmission assemblies--The student will be able to:
- 11.01 Identify the basic transmission components and functions.
  - 11.02 Apply scientific principles common to transmission technology operations.
  - 11.03 Identify principles of operation, assemblies, and systems of transmission operation.
  - 11.04 Troubleshoot and repair transmission systems.
  - 11.05 Rebuild transmission assemblies.
  - 11.06 Remove and replace transmission assemblies.
  - 11.07 Rebuild/troubleshoot retarder assembly.
- 12.0 Demonstrate the qualifications for employment--The student will be able to:
- 12.01 Demonstrate shop organization, management, and safety requirements for a transit transmission diagnosis, rebuild and repair technician.
  - 12.02 Demonstrate the use of tools and equipment required for a transit transmission diagnosis, rebuild and repair technician.
  - 12.03 Demonstrate workplace communication skills required by a transit transmission diagnosis, rebuild and repair technician.
  - 12.04 Demonstrate the application of math and science principles required for a transit transmission diagnosis, rebuild and repair technician's job tasks.
  - 12.05 Demonstrate employability skills as a transit bus transmission diagnosis, rebuild and repair technician.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Transit Bus Service 15  
**Course Number:** 9500350  
**Course Credit:** 1

The purpose of this course is to develop the competencies essential to the public transit bus technology industry. These competencies include: Demonstrating shop and occupational safety procedures, identifying principles, assemblies, and systems of engine operation, applying math skills to diesel technology tasks, applying scientific principles common to diesel technology operations, troubleshooting and repairing engine systems, rebuilding a cylinder-head assembly, removing and replacing camshaft assemblies, rebuilding a block assembly, and demonstrating the qualifications for employment.

- 13.0 Demonstrate shop and occupational safety procedures--The student will be able to:
- 13.01 Comply with safety regulations for all diesel engine diagnosis, rebuild and repair technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 13.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 14.0 Identify principles, assemblies, and systems of engine operation--The student will be able to:
- 14.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine.
  - 14.02 Identify engine assemblies and systems.
  - 14.03 Explain the operating principles of two-and four-stroke cycle engines.
  - 14.04 Identify the components of two-and four-stroke-cycle engines.
  - 14.05 Identify governor types and explain their operating principles.
- 15.0 Apply math skills to diesel technology tasks--The student will be able to:
- 15.01 Apply math skills commonly required for performing job duties in diesel technology occupations.
    - a. Recognize, identify, and make metric conversions.
    - b. Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders.
    - c. Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
    - d. Add, subtract, multiply, and divide using fractions, decimals, and whole numbers.
  - 15.02 Determine the correct purchase price, including sales tax, for a materials list containing a minimum of six items.

- 15.03 Calculate federal, state, and local taxes.
- 15.04 Explain industry time standards, including the use of flat-rate information.
- 16.0 Apply scientific principles common to diesel technology operations--The student will be able to:
  - 16.01 Explain molecular action caused by temperature extremes, chemical reaction, and moisture content.
  - 16.02 Interpret and draw reasonable conclusions from information provided in graphs, scales, and gauges.
  - 16.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 16.04 Read and interpret pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and kilopascal (KPA).
- 17.0 Troubleshoot and repair engine systems--The student will be able to:
  - 17.01 Troubleshoot and repair cooling systems.
  - 17.02 Troubleshoot and repair lubrication systems.
  - 17.03 Troubleshoot and repair induction and exhaust systems.
  - 17.04 Troubleshoot and repair diesel fuel-injection systems and components.
    - a. Inspect for operation and condition of the parts and systems, including fuel quality and consumption, safety shut-down devices, circuits, sensors, electronic governors, and flywheel.
    - b. Prime and bleed fuel-injection system.
    - c. Remove, test, and adjust injectors and nozzles.
    - d. Troubleshoot mechanical governors.
    - e. Remove, repair, and replace individual components as needed.
- 18.0 Rebuild a cylinder-head assembly--The student will be able to:
  - 18.01 Diagnose valve and head problems using the visual inspection method.
  - 18.02 Diagnose valve and head problems using the compression-tester or cylinder air-pressure method.
  - 18.03 Diagnose valve and head problems using the stethoscope method.
  - 18.04 Disassemble engines.
  - 18.05 Clean and inspect the heads for cracks, warpage, and injector sleeves.
  - 18.06 Inspect the valve seat and check for warpage, burns, cracks, and stem and tip wear.
  - 18.07 Grinds valve seats and reface valves.
  - 18.08 Check and inspect springs for free height, distortion, and installed height.
  - 18.09 Adjust the valve lash.
- 19.0 Remove and replace camshaft assemblies--The student will be able to:
  - 19.01 Remove and inspect camshaft bearings and lifters.
  - 19.02 Time valve-drive assemblies.
- 20.0 Rebuild a block assembly--The student will be able to:

- 20.01 Remove the pistons from the rod assemblies.
  - 20.02 Measure out-of-round and cylinder taper using a dial bore gauge or micrometer.
  - 20.03 Check the piston pins and boss for wear.
  - 20.04 Measure the piston ring lands width, out-of-round, and taper.
  - 20.05 Measure the piston ring gap in a cylinder bore.
  - 20.06 Install and fit the piston pins.
  - 20.07 Check the rod-and-piston assembly alignment.
  - 20.08 Remove and replace the rod bearings.
  - 20.09 Hone and clean the cylinders.
  - 20.10 Install rings on the pistons.
  - 20.11 Measure and check the crankshafts with a micrometer.
  - 20.12 Check the bearing bore with a telescope gauge.
  - 20.13 Reassemble engines using a plastic gauge.
  - 20.14 Install oil seals.
  - 20.15 Check for end play.
- 21.0 Demonstrate the qualifications for employment--The student will be able to:
- 21.01 Demonstrate shop organization, management, and safety requirements for a transit diesel engine diagnosis, rebuild and repair technician.
  - 21.02 Demonstrate the use of tools and equipment required for a transit diesel engine diagnosis, rebuild and repair technician.
  - 21.03 Demonstrate workplace communication skills required by a transit diesel engine diagnosis, rebuild and repair technician.
  - 21.04 Demonstrate the application of math and science principles required for a transit diesel engine diagnosis, rebuild and repair technician's job tasks.
  - 21.05 Demonstrate employability skills as a transit bus diesel engine diagnosis, rebuild and repair technician.

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**Florida Department of Education  
Curriculum Framework**

**Program Title:** Global Logistics and Supply Chain Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

	<b>Secondary</b>	<b>PSAV</b>
Program Number	9503100	T300100
CIP Number	0652020300	0652020300
Grade Level	9-12, 30, 31	30, 31
Standard Length	4 Credits	600 Hours
Teacher Certification	LOG TECH 7G BUS ED 1	LOG TECH 7G BUS ED 1
CTSO	SkillsUSA	SkillsUSA
SOC Codes (all applicable)	11-3071, 43-5071, 13-1081	11-3071, 43-5071, 13-1081
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)	
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>	
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>	
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>	
Basic Skills Level	N/A	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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: the global supply chain, the logistics environment, safety principles, quality control principles, work communication practices, teamwork-workplace behavior- and problem solving, supply chain computer systems, supply chain life cycle, product receiving and stocking, product order processing, product shipment, safe operation and use of equipment, inventory control, safe handling of hazardous materials, customs process/free trade, modes of transportation (air, sea, truck, and rail), dispatch operations, routing and tracking operations, and customer relations.

## Program Structure

This program is a planned sequence of instruction consisting of four OCP's.

When offered at the post secondary 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.

The following table illustrates the **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0180	Packer	150	11-3071
B	TRA0181	Material Handler	150	11-3071
C	TRA0182	Shipping, Receiving and Traffic Clerk	150	43-5071
D	TRA0183	Logistics Technician	150	13-1081

The following table illustrates the **Secondary** program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	9503110	Global Logistics and Supply Chain Technology	1 credit	11-3071	2
B	9503120	Introduction to Information Technology Applications	1 credit	11-3071	2
C	9503130	Warehouse Operations and Material Handling 1	1 credit	43-5071	2
D	9503140	Warehouse Operations and Material Handling 2	1 credit	13-1081	2

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The

activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

The PSAV component of this program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Bright Futures/Gold Seal Scholarship**

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at [https://www.osfaffelp.org/bfiehs/fnbpcm02\\_CCTMain.aspx](https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx).

### **Fine Arts/Practical Arts Credit**

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. For additional information refer to <http://www.fldoe.org/schools/pdf/ListPracticalArtsCourses.pdf>.

### **Standards**

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

- 01.0 Demonstrate an understanding of global logistics and supply chain
- 02.0 Demonstrate an understanding of transportation systems
- 03.0 Demonstrate professional communication skills

- 04.0 Demonstrate customer service skills
- 05.0 Demonstrate language arts knowledge and skills
  
- 06.0 Demonstrate an understanding of information technology applications
- 07.0 Demonstrate employability skills
- 08.0 Demonstrate science knowledge and skills
- 09.0 Demonstrate an understanding of warehouse operations
- 10.0 Demonstrate an understanding of storage and control operations
- 11.0 Demonstrate an understanding of protection skills
- 12.0 Demonstrate an understanding of economics
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 14.0 Demonstrate an understanding of career readiness
- 15.0 Demonstrate competencies in a specific career
- 16.0 Demonstrate career acquisition
- 17.0 Demonstrate career retention
- 18.0 Demonstrate integrated learning and life skills
- 19.0 Demonstrate technology and information

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Global Logistics and Supply Chain Technology**  
**PSAV Number: T300100**

**Course Number: TRA0180**  
**Occupational Completion Point: A**  
**Packer – 150 Hours – SOC Code 11-3071**

01.0 Demonstrate an understanding of global logistics and supply chain--The student will be able to:

- 01.01 Discuss the history, career fields, and benefits of the global supply chain
- 01.02 Describe principal elements of the logistics environment and logistics systems
- 01.03 Explore career pathways within global logistics and supply chain
- 01.04 Explain ways in which handling of product throughout supply chain logistics affects company's viability and profitability
- 01.05 Define basic principles of cost effectiveness throughout supply chain logistics
- 01.06 Define basic principles of just-in-time purchasing and inventory control
- 01.07 Identify major security requirements applicable to the logistics environment
- 01.08 Cite examples of environmental impact of logistics activities including "going green"
- 01.09 Describe physical layout of the logistics environment including the four stages of alignment between the operations in supply chain strategy and business strategy
- 01.10 Define basic principles of customs, free trade and international issues in Supply Chain Management

02.0 Demonstrate an understanding of transportation systems--The student will be able to:

- 02.01 Identify various transportation modes
- 02.02 Describe and contrast the different modes of transportation and their advantages/disadvantages
- 02.03 List the main considerations in determining the best mode
- 02.04 Explain how to use the information on performance of the different modes for rapid decision making
- 02.05 Give examples of transportation documentation, dispatch, routing and tracking
- 02.06 Describe and assess the domestic freight transportation system
- 02.07 Describe the government's involvement in transportation and explain freight transportation laws, regulations, and policies
- 02.08 Determine which transportation method is most appropriate for various situations

03.0 Demonstrate professional communication skills--The student will be able to:

- 03.01 Show effective methods for communications between shifts.
- 03.02 Identify effective communications to both internal and external customers.
- 03.03 Identify ways to elicit clear statements of customer requirements and specifications.
- 03.04 Provide examples of effective written communications in logistics/supply chain workplace.

- 03.05 Provide examples of effective oral communications in logistics/supply chain workplace.
  - 03.06 Demonstrate an understanding of teamwork and good professional workplace behavior to solve problems
  - 03.07 Describe a high-performance team
  - 03.08 List characteristics of an effective team member
  - 03.09 Explain ways to set team goals
  - 03.10 Identify use of team environment to solve problems and resolve conflicts
  - 03.11 Describe typical requirements for good workplace conduct
- 04.0 Demonstrate customer service skills --The student will be able to:
- 04.01 Exhibit acceptable grooming habits.
  - 04.02 Exhibit punctuality, initiative, courtesy, loyalty, and honesty.
  - 04.03 Use a personality inventory for personal improvement.
  - 04.04 Exhibit the ability to get along with others.
  - 04.05 Discuss the importance of human relations.
  - 04.06 Develop and demonstrate the unique human relations skills needed for successful entry and progress in the customer service occupations or marketing occupations selected as a career objective.
  - 04.07 Differentiate between an acceptable and an unacceptable code of business ethical conduct.
- 05.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 05.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 05.03 Present information formally and informally for specific purposes and audiences.AF2.9

**Course Number: TRA0181**

**Occupational Completion Point: B**

**Material Handler – 150 Hours – SOC Code 11-3071**

- 06.0 Demonstrate an understanding of information technology applications--The student will be able to:
- 06.01 Identify commonly used computer systems and software applications in supply chain logistics.
  - 06.02 Explain main uses of computer systems by front-line workers.
  - 06.03 Identify commonly used software systems.
  - 06.04 Explain main uses of software systems by front-line workers.
  - 06.05 Identify technologies used to capture and store logistics information.
  - 06.06 Explain the concepts and use of various information technologies in logistics.
  - 06.07 Describe the impact of technology on society
  - 06.08 Describe, access, and utilize Internet-based business
  - 06.09 Apply keyboarding techniques
  - 06.10 Navigate MS Word
  - 06.11 Create and modify computerized documents
  - 06.12 Apply basic computer systems operations
  - 06.13 Navigate MS Excel

- 06.14 Perform MS Excel dashboard functions
- 06.15 Create automated spreadsheets utilizing formulas
- 06.16 Create pivot tables
- 06.17 Select and apply information technology application for procurement, acquisition, logistics, and supply chain management.

07.0 Demonstrate employability skills--The student will be able to:

- 07.01 Identify and utilize resources used in a job search (e.g., newspaper, Internet, networking)
- 07.02 Discuss importance of drug tests and criminal background checks in identifying possible employment options.
- 07.03 Identify steps in the job application process including arranging for references and proper documentation.
- 07.04 Identify procedures and complete documents required when applying for a job (e.g., application, W-4, I-9)
- 07.05 Prepare a resume (electronic and traditional), cover letter, letter of application, follow-up letter, acceptance/rejection letter, letter of resignation, and letter of recommendation.
- 07.06 Demonstrate appropriate dress and grooming for employment
- 07.07 Demonstrate effective interviewing skills (e.g., behavioral)
- 07.08 Describe methods for handling illegal interview and application questions.
- 07.09 Discuss state and federal labor laws regulating the workplace (e.g., Child Labor Law, sexual harassment, EEOC, ADA, FMLA).
- 07.10 Identify positive work attitudes and behaviors such as honesty, compassion, respect, responsibility, fairness, trustworthiness, and caring
- 07.11 Describe importance of producing quality work and meeting performance standards.
- 07.12 Identify personal and business ethics (e.g., preventing theft, pilfering, and unauthorized discounting)
- 07.13 Demonstrate orderly and systematic behavior by creating and maintaining a monthly planner
- 07.14 Identify qualities typically required for promotion (e.g., productivity, dependability, responsibility)
- 07.15 Identify how to prepare for job separation and re-employment.
- 07.16 Create and maintain a career portfolio (e.g., resume, letters of recommendation, awards, evidence of participation in school/community/volunteer activities, employer evaluations)

08.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0

- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

**Course Number: TRA0182**

**Occupational Completion Point: C**

**Shipping, Receiving and Traffic Clerk – 150 Hours – SOC Code 43-5071**

09.0 Demonstrate an understanding of warehouse operations--The student will be able to:

- 09.01 Identify and discuss the characteristics, purpose and importance of warehouse operations and supply chain management
  - 09.02 Define material handling logistics as it applies to the warehousing function.
  - 09.03 Describe procedures for using computerized warehouse data
  - 09.04 Define movement in a warehouse and explain the concept of movement and the vital role that efficient movement of materials plays in the total functionality of the warehouse.
  - 09.05 Define "logical" in terms of the term logistics
  - 09.06 Define movement in a warehouse and identify the various locations within the warehouse where planned efficient movement of materials takes place
  - 09.07 Explain channels of distribution
  - 09.08 Discuss safety regulatory requirements and procedures
  - 09.09 Explain the importance of storage in a warehouse
  - 09.10 Define control as it applies to warehousing
  - 09.11 Explain the relationship between physical structure and protection.
  - 09.12 Identify various types of equipment available to enhance the efficient movement of materials within a warehouse
  - 09.13 Identify the various types of loading docks and cross docking
  - 09.14 Define the term "peaks and valleys" as it applies to warehouse activity
  - 09.15 Explain the importance of staging and JIT.
  - 09.16 Identify the primary types of hand-operated pieces of warehouse equipment.
  - 09.17 Identify the important characteristics of industrial trucks
  - 09.18 Explain the concept of "balancing" as it applies to counterbalanced lift trucks.
  - 09.19 Define the term *narrow aisle* as it applies to fork trucks
  - 09.20 Identify warehouse documents (e.g., pick tickets, special orders, inventory forms)
  - 09.21 Display and interpret inventory screens, receive, inspect, and stock inventory
  - 09.22 Apply basic computer systems operations
- 10.0 Demonstrate an understanding of storage and control operations--The student will be able to:
- 10.01 Explain the concepts involved in determining the best method
  - 10.02 for storage and the equipment needed to facilitate a cost effective and efficient warehouse
  - 10.03 Identify the factors that are involved with the calculating and estimating of the storage area needed for retention of materials in a warehouse
  - 10.04 Identify the possibilities and combinations of systems and equipment that can be used for storage areas in a warehouse
  - 10.05 Define the following storage related terms: Size, Volume, Density, Pallet, and Case
  - 10.06 Define the terms packaging, SKU, stacking frame, term "Logistics Execution Systems" (LES), signage and signposting, "real time" and barcoding
  - 10.07 Explain how the volume of materials, space usage, and control affect the design of storage space in a warehouse design
  - 10.08 Explain inventories and their importance
  - 10.09 Identify the simplest form of warehouse storage
  - 10.10 Identify the two key issues in planning block stacking
  - 10.11 Identify the basic configuration for pallet rack
  - 10.12 Explain the concept of control in the broadest possible context and the importance of keeping track of materials and goods

- 10.13 Identify the various types of technologies developed over the years to keep track of goods within the warehouse
  - 10.14 Identify various labeling and packaging schemes available for securing and tracking the movement of items through a warehouse
  - 10.15 Define the components of an LES
  - 10.16 Explain the importance of addresses in signage
  - 10.17 Define information-filled labeling
  - 10.18 Identify key magnetic devices used in automatic data capture
  - 10.19 Define radio frequency identification (RFID)
  - 10.20 Explain the importance of automation in warehousing
- 11.0 Demonstrate an understanding of protection skills--The student will be able to:
- 11.01 Identify the role that protection plays in the total concept of "warehousing"
  - 11.02 Identify the various forms of unit load formation equipment that is used for protecting materials
  - 11.03 Identify the types of load containment materials which includes the machinery that dispenses them
  - 11.04 Situations where they are most advantageously used
  - 11.05 Explain the following: the need and means for protecting warehouse personnel and materials as they go about their duties
  - 11.06 Identify the advantages and disadvantages of open-air or soft-wall warehousing for protection of warehoused items
  - 11.07 Compliance issues
- 12.0 Demonstrate economics--The student will be able to:
- 12.01 Demonstrate understanding of goals, resources and structure of an organization
  - 12.02 Understand the concepts and contributions of entrepreneurship
  - 12.03 Compare and contrast the advantages and disadvantages of the various forms of business ownership
  - 12.04 Understand economic principles affecting business cycles and the workforce
  - 12.05 Analyze possible solutions to specific business problems
  - 12.06 Apply economic decisions related to personal financial affairs, the successful operation of organizations and within a global economy
  - 12.07 Understand the role of a consumer, producer, saver and investor in the market system
  - 12.08 Understand the concepts and laws pertaining to customs and free trade
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 13.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 13.02 Explain emergency procedures to follow in response to workplace accidents.
  - 13.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: TRA0183**  
**Occupational Completion Point: D**  
**Logistics Technician – 150 Hours – SOC Code 13-1081**

14.0 Demonstrate career readiness--The student will be able to:

- 14.01 Explain the importance of life-long learning
- 14.02 Evaluate/research occupational interests
- 14.03 Demonstrate attitudes/ethics needed for career success
- 14.04 Assess personal strengths, talents, values and interests to appropriate jobs and careers to maximize career potential
- 14.05 Use a variety of research tools (e.g., computer-assisted programs, newspapers, books, industry tours, job shadows, career fairs and the Internet) in the career exploration process
- 14.06 Evaluate postsecondary training opportunities related to career interests, including certification, licensing, apprenticeships, college and military options
- 14.07 Relate and identify career interests and transferable skills necessary for opportunities in the global workforce
- 14.08 Develop an individual career plan and portfolio
- 14.09 Analyze needs of business and industry on labor and economic trends
- 14.10 Describe the changing roles including non-traditional occupations in the workplace

15.0 Demonstrate competencies in a specific career--The student will be able to:

- 15.01 Demonstrate job performance skills as outlined in the training plan
- 15.02 Exhibit effective workplace safety practices including use of protective devices
- 15.03 Display an acceptable level of productivity and quality control
- 15.04 Demonstrate effective written and oral communication and listening skills when interacting with customers, co-workers, and managers
- 15.05 Demonstrate decision making and problem solving processes and techniques used in the workplace.
- 15.06 Demonstrate acceptable work habits and conduct in the workplace as defined by company policy
- 15.07 Demonstrate an understanding of the company's vision and mission statements.
- 15.08 Demonstrate an understanding of the company's goals and objectives
- 15.09 Demonstrate familiarity with the company's products and services
- 15.10 Demonstrate the ability to identify authority, rights, and responsibilities of both employers and employees

16.0 Demonstrate career acquisition--The student will be able to:

- 16.01 Participate in work-based learning opportunities such as: mentoring, cooperative work, job shadows, apprenticeships and internships
- 16.02 Demonstrate effective oral and written communication skills necessary for employment
- 16.03 Demonstrate job search skills using a variety of resources
- 16.04 Apply the decision-making process to the various stages of the work life cycle
- 16.05 Identify and demonstrate employability skills including job search, selection, the interviewing process, proper dress and presentation



- 16.06 Compare and contrast compensation packages that include varying levels of wages and benefits
- 17.0 Demonstrate career retention--The student will be able to:
  - 17.01 Demonstrate positive personal qualities and self-management skills (i.e. time management, organization, punctuality and attendance)
  - 17.02 Describe how productivity, work ethic and quality affect job stability
  - 17.03 Demonstrate communication team-building and leadership skills
  - 17.04 Demonstrate personal health and workplace safety procedures
  - 17.05 Identify biases, harassment and discriminatory behaviors impacting job success and advancement
  - 17.06 Acknowledge and respond to constructive criticism and employment evaluation
  - 17.07 Understand the importance of following company policy and procedures and the legal ramifications of labor laws impacting employment
  - 17.08 Understand the role of compromise in conflict resolution
- 18.0 Demonstrate integrated learning and life skills--The student will be able to:
  - 18.01 Demonstrate the integration and application of academic and occupational skills in school, work and personal lives
  - 18.02 Use communication, mathematical and technical skills to compare, compute, and analyze complex information
  - 18.03 Discuss how personal choices, experiences, technology, education/training and other factors correlate with earning a living
  - 18.04 Discuss how income from employment is affected by factors such as supply and demand, geographic location, level of education, type of industry, union membership, productivity skill level and work ethic
  - 18.05 Compare and contrast strategies for personal finance and risk management
  - 18.06 Demonstrate the ability to set, monitor and achieve clearly defined goals
- 19.0 Demonstrate technology and information--The students will be able to:
  - 19.01 Apply knowledge of technology to identify and solve problems
  - 19.02 Identify and evaluate how information technology developments have changed the way people work
  - 19.03 Select, apply and troubleshoot software and hardware as they apply to a variety of work applications
  - 19.04 Describe how new developments in varied fields or technology affect the job market and the level of worker's responsibilities
  - 19.05 Analyze the ethical issues surrounding access, privacy and confidentiality of information in emerging technologies
  - 19.06 Explore current and future positions and career paths in field of technology
  - 19.07 Identify job tasks that presently are and will be in the future performed in the specified occupation (training plan).
  - 19.08 Create a training plan indicating competencies mastered
  - 19.09 Maintain a record of employment hours and wages for auditing and budgetary purposes (e.g., time cards, budget sheets)
  - 19.10 Maintain an up-to-date, signed training agreement

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Global Logistics and Supply Chain Technology  
**Course Number:** 9503110  
**Course Credit:** 1 credit

**Course Description:**

01.0 Demonstrate an understanding of global logistics and supply chain--The student will be able to:

- 01.01 Discuss the history, career fields, and benefits of the global supply chain
- 01.02 Describe principal elements of the logistics environment and logistics systems
- 01.03 Explore career pathways within global logistics and supply chain
- 01.04 Explain ways in which handling of product throughout supply chain logistics affects company's viability and profitability
- 01.05 Define basic principles of cost effectiveness throughout supply chain logistics
- 01.06 Define basic principles of just-in-time purchasing and inventory control
- 01.07 Identify major security requirements applicable to the logistics environment
- 01.08 Cite examples of environmental impact of logistics activities including "going green"
- 01.09 Describe physical layout of the logistics environment including the four stages of alignment between the operations in supply chain strategy and business strategy
- 01.10 Define basic principles of customs, free trade and international issues in Supply Chain Management

02.0 Demonstrate an understanding of transportation systems--The student will be able to:

- 02.01 Identify various transportation modes
- 02.02 Describe and contrast the different modes of transportation and their advantages/disadvantages
- 02.03 List the main considerations in determining the best mode
- 02.04 Explain how to use the information on performance of the different modes for rapid decision making
- 02.05 Give examples of transportation documentation, dispatch, routing and tracking
- 02.06 Describe and assess the domestic freight transportation system
- 02.07 Describe the government's involvement in transportation and explain freight transportation laws, regulations, and policies
- 02.08 Determine which transportation method is most appropriate for various situations

03.0 Demonstrate professional communication skills--The student will be able to:

- 03.01 Show effective methods for communications between shifts.
- 03.02 Identify effective communications to both internal and external customers.
- 03.03 Identify ways to elicit clear statements of customer requirements and specifications.
- 03.04 Provide examples of effective written communications in logistics/supply chain workplace.

- 03.05 Provide examples of effective oral communications in logistics/supply chain workplace.
  - 03.06 Demonstrate an understanding of teamwork and good professional workplace behavior to solve problems
  - 03.07 Describe a high-performance team
  - 03.08 List characteristics of an effective team member
  - 03.09 Explain ways to set team goals
  - 03.10 Identify use of team environment to solve problems and resolve conflicts
  - 03.11 Describe typical requirements for good workplace conduct
- 04.0 Demonstrate customer service skills --The student will be able to:
- 04.01 Exhibit acceptable grooming habits.
  - 04.02 Exhibit punctuality, initiative, courtesy, loyalty, and honesty.
  - 04.03 Use a personality inventory for personal improvement.
  - 04.04 Exhibit the ability to get along with others.
  - 04.05 Discuss the importance of human relations.
  - 04.06 Develop and demonstrate the unique human relations skills needed for successful entry and progress in the customer service occupations or marketing occupations selected as a career objective.
  - 04.07 Differentiate between an acceptable and an unacceptable code of business ethical conduct.
- 05.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 05.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 05.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 05.03 Present information formally and informally for specific purposes and audiences.AF2.9

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Introduction to Information Technology Applications  
**Course Number:** 9503120  
**Course Credit:** 1 credit

**Course Description:**

06.0 Demonstrate an understanding of information technology applications--The student will be able to:

- 06.01 Identify commonly used computer systems and software applications in supply chain logistics.
- 06.02 Explain main uses of computer systems by front-line workers.
- 06.03 Identify commonly used software systems.
- 06.04 Explain main uses of software systems by front-line workers.
- 06.05 Identify technologies used to capture and store logistics information.
- 06.06 Explain the concepts and use of various information technologies in logistics.
- 06.07 Describe the impact of technology on society
- 06.08 Describe, access, and utilize Internet-based business
- 06.09 Apply keyboarding techniques
- 06.10 Navigate MS Word
- 06.11 Create and modify computerized documents
- 06.12 Apply basic computer systems operations
- 06.13 Navigate MS Excel
- 06.14 Perform MS Excel dashboard functions
- 06.15 Create automated spreadsheets utilizing formulas
- 06.16 Create pivot tables
- 06.17 Select and apply information technology application for procurement, acquisition, logistics, and supply chain management.

07.0 Demonstrate employability skills--The student will be able to:

- 07.01 Identify and utilize resources used in a job search (e.g., newspaper, Internet, networking)
- 07.02 Discuss importance of drug tests and criminal background checks in identifying possible employment options.
- 07.03 Identify steps in the job application process including arranging for references and proper documentation.
- 07.04 Identify procedures and complete documents required when applying for a job (e.g., application, W-4, I-9)
- 07.05 Prepare a resume (electronic and traditional), cover letter, letter of application, follow-up letter, acceptance/rejection letter, letter of resignation, and letter of recommendation.
- 07.06 Demonstrate appropriate dress and grooming for employment
- 07.07 Demonstrate effective interviewing skills (e.g., behavioral)
- 07.08 Describe methods for handling illegal interview and application questions.

- 07.09 Discuss state and federal labor laws regulating the workplace (e.g., Child Labor Law, sexual harassment, EEOC, ADA, FMLA).
  - 07.10 Identify positive work attitudes and behaviors such as honesty, compassion, respect, responsibility, fairness, trustworthiness, and caring
  - 07.11 Describe importance of producing quality work and meeting performance standards.
  - 07.12 Identify personal and business ethics (e.g., preventing theft, pilfering, and unauthorized discounting)
  - 07.13 Demonstrate orderly and systematic behavior by creating and maintaining a monthly planner
  - 07.14 Identify qualities typically required for promotion (e.g., productivity, dependability, responsibility)
  - 07.15 Identify how to prepare for job separation and re-employment.
  - 07.16 Create and maintain a career portfolio (e.g., resume, letters of recommendation, awards, evidence of participation in school/community/volunteer activities, employer evaluations)
- 08.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Warehouse Operations and Material Handling 1  
**Course Number:** 9503130  
**Course Credit:** 1 credit

**Course Description:**

09.0 Demonstrate an understanding of warehouse operations--The student will be able to:

- 09.01 Identify and discuss the characteristics, purpose and importance of warehouse operations and supply chain management
- 09.02 Define material handling logistics as it applies to the warehousing function.
- 09.03 Describe procedures for using computerized warehouse data
- 09.04 Define movement in a warehouse and explain the concept of movement and the vital role that efficient movement of materials plays in the total functionality of the warehouse.
- 09.05 Define "logical" in terms of the term logistics
- 09.06 Define movement in a warehouse and identify the various locations within the warehouse where planned efficient movement of materials takes place
- 09.07 Explain channels of distribution
- 09.08 Discuss safety regulatory requirements and procedures
- 09.09 Explain the importance of storage in a warehouse
- 09.10 Define control as it applies to warehousing
- 09.11 Explain the relationship between physical structure and protection.
- 09.12 Identify various types of equipment available to enhance the efficient movement of materials within a warehouse
- 09.13 Identify the various types of loading docks and cross docking
- 09.14 Define the term "peaks and valleys" as it applies to warehouse activity
- 09.15 Explain the importance of staging and JIT.
- 09.16 Identify the primary types of hand-operated pieces of warehouse equipment.
- 09.17 Identify the important characteristics of industrial trucks
- 09.18 Explain the concept of "balancing" as it applies to counterbalanced lift trucks.
- 09.19 Define the term *narrow aisle* as it applies to fork trucks
- 09.20 Identify warehouse documents (e.g., pick tickets, special orders, inventory forms)
- 09.21 Display and interpret inventory screens, receive, inspect, and stock inventory
- 09.22 Apply basic computer systems operations

10.0 Demonstrate an understanding of storage and control operations--The student will be able to:

- 10.01 Explain the concepts involved in determining the best method
- 10.02 for storage and the equipment needed to facilitate a cost effective and efficient warehouse
- 10.03 Identify the factors that are involved with the calculating and estimating of the storage area needed for retention of materials in a warehouse

- 10.04 Identify the possibilities and combinations of systems and equipment that can be used for storage areas in a warehouse
  - 10.05 Define the following storage related terms: Size, Volume, Density, Pallet, and Case
  - 10.06 Define the terms packaging, SKU, stacking frame, term "Logistics Execution Systems" (LES), signage and signposting, "real time" and barcoding
  - 10.07 Explain how the volume of materials, space usage, and control affect the design of storage space in a warehouse design
  - 10.08 Explain inventories and their importance
  - 10.09 Identify the simplest form of warehouse storage
  - 10.10 Identify the two key issues in planning block stacking
  - 10.11 Identify the basic configuration for pallet rack
  - 10.12 Explain the concept of control in the broadest possible context and the importance of keeping track of materials and goods
  - 10.13 Identify the various types of technologies developed over the years to keep track of goods within the warehouse
  - 10.14 Identify various labeling and packaging schemes available for securing and tracking the movement of items through a warehouse
  - 10.15 Define the components of an LES
  - 10.16 Explain the importance of addresses in signage
  - 10.17 Define information-filled labeling
  - 10.18 Identify key magnetic devices used in automatic data capture
  - 10.19 Define radio frequency identification (RFID)
  - 10.20 Explain the importance of automation in warehousing
- 11.0 Demonstrate an understanding of protection skills--The student will be able to:
- 11.01 Identify the role that protection plays in the total concept of "warehousing"
  - 11.02 Identify the various forms of unit load formation equipment that is used for protecting materials
  - 11.03 Identify the types of load containment materials which includes the machinery that dispenses them
  - 11.04 Situations where they are most advantageously used
  - 11.05 Explain the following: the need and means for protecting warehouse personnel and materials as they go about their duties
  - 11.06 Identify the advantages and disadvantages of open-air or soft-wall warehousing for protection of warehoused items
  - 11.07 Compliance issues
- 12.0 Demonstrate economics--The student will be able to:
- 12.01 Demonstrate understanding of goals, resources and structure of an organization
  - 12.02 Understand the concepts and contributions of entrepreneurship
  - 12.03 Compare and contrast the advantages and disadvantages of the various forms of business ownership
  - 12.04 Understand economic principles affecting business cycles and the workforce
  - 12.05 Analyze possible solutions to specific business problems
  - 12.06 Apply economic decisions related to personal financial affairs, the successful operation of organizations and within a global economy
  - 12.07 Understand the role of a consumer, producer, saver and investor in the market system

- 12.08 Understand the concepts and laws pertaining to customs and free trade
- 13.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
  - 13.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 13.02 Explain emergency procedures to follow in response to workplace accidents.
  - 13.03 Create a disaster and/or emergency response plan. SHE 2.0



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Course Title:** Warehouse Operations and Material Handling 2  
**Course Number:** 9503140  
**Course Credit:** 1 credit

**Course Description:**

14.0 Demonstrate career readiness--The student will be able to:

- 14.01 Explain the importance of life-long learning
- 14.02 Evaluate/research occupational interests
- 14.03 Demonstrate attitudes/ethics needed for career success
- 14.04 Assess personal strengths, talents, values and interests to appropriate jobs and careers to maximize career potential
- 14.05 Use a variety of research tools (e.g., computer-assisted programs, newspapers, books, industry tours, job shadows, career fairs and the Internet) in the career exploration process
- 14.06 Evaluate postsecondary training opportunities related to career interests, including certification, licensing, apprenticeships, college and military options
- 14.07 Relate and identify career interests and transferable skills necessary for opportunities in the global workforce
- 14.08 Develop an individual career plan and portfolio
- 14.09 Analyze needs of business and industry on labor and economic trends
- 14.10 Describe the changing roles including non-traditional occupations in the workplace

15.0 Demonstrate competencies in a specific career--The student will be able to:

- 15.01 Demonstrate job performance skills as outlined in the training plan
- 15.02 Exhibit effective workplace safety practices including use of protective devices
- 15.03 Display an acceptable level of productivity and quality control
- 15.04 Demonstrate effective written and oral communication and listening skills when interacting with customers, co-workers, and managers
- 15.05 Demonstrate decision making and problem solving processes and techniques used in the workplace.
- 15.06 Demonstrate acceptable work habits and conduct in the workplace as defined by company policy
- 15.07 Demonstrate an understanding of the company's vision and mission statements.
- 15.08 Demonstrate an understanding of the company's goals and objectives
- 15.09 Demonstrate familiarity with the company's products and services
- 15.10 Demonstrate the ability to identify authority, rights, and responsibilities of both employers and employees

16.0 Demonstrate career acquisition--The student will be able to:

- 16.01 Participate in work-based learning opportunities such as: mentoring, cooperative work, job shadows, apprenticeships and internships
  - 16.02 Demonstrate effective oral and written communication skills necessary for employment
  - 16.03 Demonstrate job search skills using a variety of resources
  - 16.04 Apply the decision-making process to the various stages of the work life cycle
  - 16.05 Identify and demonstrate employability skills including job search, selection, the interviewing process, proper dress and presentation
  - 16.06 Compare and contrast compensation packages that include varying levels of wages and benefits
- 17.0 Demonstrate career retention--The student will be able to:
- 17.01 Demonstrate positive personal qualities and self-management skills (i.e. time management, organization, punctuality and attendance)
  - 17.02 Describe how productivity, work ethic and quality affect job stability
  - 17.03 Demonstrate communication team-building and leadership skills
  - 17.04 Demonstrate personal health and workplace safety procedures
  - 17.05 Identify biases, harassment and discriminatory behaviors impacting job success and advancement
  - 17.06 Acknowledge and respond to constructive criticism and employment evaluation
  - 17.07 Understand the importance of following company policy and procedures and the legal ramifications of labor laws impacting employment
  - 17.08 Understand the role of compromise in conflict resolution
- 18.0 Demonstrate integrated learning and life skills--The student will be able to:
- 18.01 Demonstrate the integration and application of academic and occupational skills in school, work and personal lives
  - 18.02 Use communication, mathematical and technical skills to compare compute, and analyze complex information
  - 18.03 Discuss how personal choices, experiences, technology, education/training and other factors correlate with earning a living
  - 18.04 Discuss how income from employment is affected by factors such as supply and demand, geographic location, level of education, type of industry, union membership, productivity skill level and work ethic
  - 18.05 Compare and contract strategies for personal finance and risk management
  - 18.06 Demonstrate the ability to set, monitor and achieve clearly defined goals
- 19.0 Demonstrate technology and information--The students will be able to:
- 19.01 Apply knowledge of technology to identify and solve problems
  - 19.02 Identify and evaluate how information technology developments have changed the way people work
  - 19.03 Select, apply and troubleshoot software and hardware as they apply to a variety of work applications
  - 19.04 Describe how new developments in varied fields or technology affect the job market and the level of worker's responsibilities
  - 19.05 Analyze the ethical issues surrounding access, privacy and confidentiality of information in emerging technologies
  - 19.06 Explore current and future positions and career paths in field of technology

- 19.07 Identify job tasks that presently are and will be in the future performed in the specified occupation (training plan).
- 19.08 Create a training plan indicating competencies mastered
- 19.09 Maintain a record of employment hours and wages for auditing and budgetary purposes (e.g., time cards, budget sheets)
- 19.10 Maintain an up-to-date, signed training agreement

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Avionics  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I470199
CIP Number	0647.019901
Grade Level	30, 31
Standard Length	2120 hours
Teacher Certification	AVIONICS @7 G ELECTRONIC @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2091
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 10.0 Reading: 10.0

### **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, troubleshooting, repair and installation of airborne radio communications, radio navigation and radar equipment systems in accordance with regulatory and industry standards. Also included is instruction in basics of AM and FM transmitters and receivers and avionics equipment. Skills preparation for passing licensing/certification tests required by industry forms an integral part of the curriculum.

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

### Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0010	Electronics Assembler	250	49-2091
B	EEV0100	Electronics Tester	400	49-2091
C	EEV0500	Electronics Equipment Repairer	375	49-2091
D	EEV0616	Electronics Technician	375	49-2091
E	AVS0090	Avionics Technical Publications Technician	180	49-2091
F	AVS0091	Avionics Installer	180	49-2091
G	AVS0092	Avionics Communication System Technician	180	49-2091
H	AVS0093	Avionics Technician	180	49-2091

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Avionics industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Electronic Technology and/or Electronic Engineering Technology and/or equipment training and/or work experience are prerequisites for entry into this electronic specialization. Algebra is recommended as a prerequisite for entry into this program.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 10.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

## **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

## **Standards**

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

- 01.0 Demonstrate proficiency in soldering and basic laboratory practices.
- 02.0 Demonstrate proficiency in basic D.C. circuits.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Demonstrate science knowledge and skills
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.

- 06.0 Demonstrate proficiency in advanced D.C. circuits.
- 07.0 Demonstrate proficiency in A.C. circuits.
- 08.0 Demonstrate proficiency in solid state devices.
- 09.0 Demonstrate language arts knowledge and skills
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 12.0 Demonstrate proficiency in digital circuits.
- 13.0 Demonstrate proficiency in fundamental micro-processors.
- 14.0 Use information technology tools
- 15.0 Describe the importance of professional ethics and legal responsibilities.
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies
- 17.0 Demonstrate proficiency in analog circuits.
- 18.0 Demonstrate skills in technical recording.
- 19.0 Demonstrate proficiency in AM and FM transmitters.
- 20.0 Demonstrate proficiency in AM and FM receivers.
- 21.0 Demonstrate proficiency in AM and FM transceivers.
- 22.0 Demonstrate proficiency in electromagnetic wave emissions.
- 23.0 Demonstrate proficiency in avionics radio repair station regulations and procedures.
- 24.0 Demonstrate proficiency in aircraft electrical systems and ground safety.
- 25.0 Demonstrate proficiency in line and bench maintenance of airborne communication systems.
- 26.0 Demonstrate proficiency in line and bench maintenance of airborne radio navigation systems and equipment.
- 27.0 Demonstrate proficiency in line and bench maintenance of airborne radar systems.
- 28.0 Demonstrate proficiency in the principles of operation of area navigation (R-NAV) systems.
- 29.0 Demonstrate proficiency in installing avionics systems.
- 30.0 Demonstrate proficiency in the calibration of test equipment.
- 31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 33.0 Explain the importance of employability and entrepreneurship skills



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Avionics**  
**PSAV Number: I470199**

**Course Number: EEV0010**  
**Occupational Completion Point: A**  
**Electronics Assembler – 250 Hours – SOC Code 49-2091**

- 01.0 Demonstrate proficiency in soldering basic laboratory practices--The student will be able to:
- 01.01 Apply proper Occupational Safety Health Administration (OSHA) safety standards.
  - 01.02 Make electrical connections.
  - 01.03 Identify and use hand tools properly.
  - 01.04 Identify and use power tools properly.
  - 01.05 Demonstrate acceptable soldering techniques.
  - 01.06 Demonstrate acceptable desoldering techniques.
  - 01.07 Demonstrate electrostatic discharge (ESD) safety procedures.
  - 01.08 Describe the construction of printed circuit boards (PCB's).
  - 01.09 Explain the theoretical concepts of soldering.
  - 01.10 Demonstrate rework and repair techniques.
- 02.0 Demonstrate proficiency in basic direct current (DC) circuits--The student will be able to:
- 02.01 Demonstrate proficiency in basic D.C. circuits.
  - 02.02 Solve problems in electronic units utilizing metric prefixes.
  - 02.03 Identify sources of electricity.
  - 02.04 Define voltage, current, resistance, power and energy.
  - 02.05 Apply Ohm's law and power formulas.
  - 02.06 Read and interpret color codes and symbols to identify electrical components and values.
  - 02.07 Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) and oscilloscopes.
  - 02.08 Compute conductance and compute and measure resistance of conductors and insulators.
  - 02.09 Apply Ohm's law to series circuits.
  - 02.10 Construct and verify operation of series circuits.
  - 02.11 Analyze and troubleshoot series circuits.
  - 02.12 Apply Ohm's law to parallel circuits.
  - 02.13 Construct and verify the operation of parallel circuits.
  - 02.14 Analyze and troubleshoot parallel circuits.
- 03.0 Demonstrate mathematics knowledge and skills. -- The students will be able to:
- 03.01 Demonstrate knowledge of arithmetic operations. AF3.0
  - 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.2
  - AF3.4

- 03.03 Construct charts/tables/graphs using functions and data. AF3.5
- 04.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 04.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 04.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 05.02 Locate, organize and reference written information from various sources. CM 3.0
- 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 05.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 05.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: EEV0100**  
**Occupational Completion Point: B**  
**Electronics Tester – 400 Hours – SOC Code 49-2091**

- 06.0 Demonstrate proficiency in D.C. circuits--The student will be able to:
- 06.01 Solve algebraic problems to include exponentials to DC.
- 06.02 Relate electricity to the nature of matter.
- 06.03 Apply Ohm's law to series-parallel and parallel-series circuits.
- 06.04 Construct and verify the operation of series-parallel and parallel-series and bridge circuits.
- 06.05 Troubleshoot series-parallel and parallel-series and bridge circuits.
- 06.06 Identify and define voltage divider circuits (loaded and unloaded).
- 06.07 Construct and verify the operation of voltage divider circuits (loaded and unloaded).
- 06.08 Analyze and troubleshoot voltage divider circuits (loaded and unloaded).
- 06.09 Apply maximum power transfer theorem.
- 06.10 Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.
- 06.11 Describe magnetic properties of circuits and devices.
- 06.12 Determine the physical and electrical characteristics of capacitors and inductors.
- 06.13 Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.
- 06.14 Set up and operate power supplies for DC circuits.
- 07.0 Demonstrate proficiency in A.C. circuits--The student will be able to:
- 07.01 Solve basic trigonometric problem as applicable to electronics.

- 07.02 Define the characteristics of AC capacitive circuits.
  - 07.03 Construct and verify the operation of AC capacitive circuits.
  - 07.04 Analyze and troubleshoot AC capacitive circuits.
  - 07.05 Define the characteristics of AC inductive circuits.
  - 07.06 Construct and verify the operation of AC inductive circuits.
  - 07.07 Analyze and troubleshoot AC inductive circuits.
  - 07.08 Define and apply the principles of transformers to AC circuits.
  - 07.09 Construct and verify the operation of AC circuits utilizing transformers.
  - 07.10 Analyze and troubleshoot AC circuits utilizing transformers.
  - 07.11 Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.
  - 07.12 Analyze and troubleshoot differentiator and integrator circuits.
  - 07.13 Define the characteristics of resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).
  - 07.14 Construct and verify the operation of series and parallel resonant circuits.
  - 07.15 Define the characteristics of series and parallel resonant circuits.
  - 07.16 Construct and verify the operation of series and parallel resonant circuits.
  - 07.17 Analyze and troubleshoot R-C, R-L, and RLC circuits.
  - 07.18 Define the characteristics of frequency selective filter circuits.
  - 07.19 Construct and verify the operation of frequency selective filter circuits.
  - 07.20 Analyze and troubleshoot frequency selective filter circuits.
  - 07.21 Define the characteristics of polyphase circuits.
  - 07.22 Define basic motor theory and operation.
  - 07.23 Define basic generator theory and operation.
  - 07.24 Set up and operate power supplies for AC circuits.
  - 07.25 Analyze and measure power in AC circuits.
  - 07.26 Set up and operate capacitor and inductor analyzers for AC circuits.
- 08.0 Demonstrate proficiency in solid state devices--The student will be able to:
- 08.01 Identify and define properties of semiconductor materials.
  - 08.02 Identify and define operating characteristics and applications of junction diodes.
  - 08.03 Identify and define operating characteristics and applications of special diodes.
  - 08.04 Construct diode circuits.
  - 08.05 Analyze and troubleshoot diode circuits.
  - 08.06 Identify and define operating characteristics and applications of bipolar transistors,
  - 08.07 Identify and define operating characteristics and applications of field effect transistors.
  - 08.08 Identify and define operating characteristics and applications of single-stage amplifiers.
  - 08.09 Construct single-stage amplifiers.
  - 08.10 Analyze and troubleshoot single-stage amplifiers.
  - 08.11 Construct thyristor circuitry.
  - 08.12 Analyze and troubleshoot thyristor circuitry.
  - 08.13 Set up and operate VOM for solid-state devices.
  - 08.14 Set up and operate DVM for solid-state devices.
  - 08.15 Set up and operate power supplies for solid-state devices.
  - 08.16 Set up and operate oscilloscopes for solid-state devices.
  - 08.17 Set up and operate function generators for solid-state devices.
  - 08.18 Set up and operate capacitor and inductor analyzers for solid-state devices.

- 08.19 Set up and operate curve tracers.
- 08.20 Set up and operate transistor testers.
- 09.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 09.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 09.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 09.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 10.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 10.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 11.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 11.02 Explain emergency procedures to follow in response to workplace accidents.
- 11.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: EEV0500****Occupational Completion Point: C****Electronics Equipment Repairer – 375 Hours – SOC Code 49-2091**

- 12.0 Demonstrate proficiency in digital circuits--The student will be able to:
- 12.01 Define and apply numbering systems to codes and arithmetic operations.
- 12.02 Analyze and minimize logic circuits using Boolean operations.
- 12.03 Set up and operate logic probes for digital circuits.
- 12.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.
- 12.05 Set up and operate pulsers for digital circuits.
- 12.06 Set up and operate oscilloscopes for digital circuits.
- 12.07 Set up and operate logic analyzers for digital circuits.
- 12.08 Set up and operate pulse generators for digital circuits.
- 12.09 Identify types of logic gates and their truth tables.
- 12.10 Construct combinational logic circuits using integrated circuits.
- 12.11 Troubleshoot logic circuits.
- 12.12 Analyze types of flip-flops and their truth tables.
- 12.13 Construct flip-flops using integrated circuits.
- 12.14 Troubleshoot flip-flops.

- 12.15 Identify, define and measure characteristics of integrated circuit (IC) logic families.
  - 12.16 Identify types of registers and counters.
  - 12.17 Construct registers and counters using flip-flops and logic gates.
  - 12.18 Troubleshoot registers and counters.
  - 12.19 Analyze clock and timing circuits.
  - 12.20 Construct clock and timing circuits.
  - 12.21 Troubleshoot clock and timing circuits.
  - 12.22 Identify types of arithmetic-logic circuits.
  - 12.23 Construct arithmetic-logic circuits.
  - 12.24 Troubleshoot arithmetic-logic circuits.
  - 12.25 Identify types of encoding and decoding devices.
  - 12.26 Construct encoders and decoders.
  - 12.27 Troubleshoot encoders and decoders.
  - 12.28 Identify types of multiplexer and demultiplexer circuits.
  - 12.29 Construct multiplexer and demultiplexer circuits using integrated circuits.
  - 12.30 Troubleshoot multiplexer and demultiplexer circuits.
  - 12.31 Identify types of memory circuits.
  - 12.32 Relate the uses of digital-to-analog and analog-to-digital conversions.
  - 12.33 Construct digital-to-analog and analog-to-digital circuits.
  - 12.34 Troubleshoot digital-to-analog and analog-to-digital circuits.
  - 12.35 Identify types of digital displays.
  - 12.36 Construct digital display circuits.
  - 12.37 Troubleshoot digital display circuits.
- 13.0 Demonstrate proficiency in fundamental micro processors--The student will be able to:
- 13.01 Identify central processing unit (CPU) building blocks and their uses (architecture).
  - 13.02 Analyze bus concepts.
  - 13.03 Analyze various memory schemes.
  - 13.04 Use memory devices in circuits.
  - 13.05 Troubleshoot memory device circuits.
  - 13.06 Set up and operate oscilloscopes for microprocessor systems.
  - 13.07 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.
  - 13.08 Identify types of input and output devices and peripherals.
  - 13.09 Interface input and output ports to peripherals.
  - 13.10 Analyze and troubleshoot input and output ports.
  - 13.11 Write a macro processor program in assembly language.
  - 13.12 Write a macro processor program in machine language.
  - 13.13 Execute micro processor instruction sets.
- 14.0 Use information technology tools. -- The students will be able to:
- 14.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0

- 14.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 15.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 15.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 15.02 Evaluate alternative responses to workplace situations based on personal, a. professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 15.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 15.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 16.02 Describe the effect of money management on personal and career goals. FL 3.0
- 16.03 Develop a personal budget and financial goals. FL3.1
- 16.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 16.05 Maintain financial records. FL3.3
- 16.06 Read and reconcile financial statements. FL3.4
- 16.07 Research, compare and contrast investment opportunities.

**Course Number: EEV0616****Occupational Completion Point: D****Electronics Technician – 375 Hours – SOC Code 49-2091**

- 17.0 Demonstrate proficiency in analog circuits--The student will be able to:
- 17.01 Identify and define operational characteristics and applications of multistage amplifiers.
- 17.02 Construct multistage amplifiers.
- 17.03 Analyze and troubleshoot multistage amplifiers.
- 17.04 Identify and define operating characteristics and applications of linear integrated circuits.
- 17.05 Identify and define operating characteristics and applications of basic power supplies and filters.
- 17.06 Construct basic power supplies and filters.
- 17.07 Identify and define operating characteristics and applications of differential and operational amplifiers.
- 17.08 Construct differential and operational amplifier circuits.
- 17.09 Analyze and troubleshoot differential and operational amplifier circuits.
- 17.10 Identify and define operating characteristics of audio power amplifiers.
- 17.11 Construct audio power amplifiers.
- 17.12 Construct audio power amplifiers.
- 17.13 Analyze and troubleshoot audio power amplifiers.
- 17.14 Identify and define operating characteristics and applications of power supply regulator circuits.
- 17.15 Construct power supply regulator circuits.
- 17.16 Analyze and troubleshoot power supply regulator circuits.

- 17.17 Identify and define operating characteristics and applications of active filters.
- 17.18 Construct active filter circuits.
- 17.19 Analyze and troubleshoot active filter circuits.
- 17.20 Identify and define operating characteristics and applications of sinusoidal and nonsinusoidal oscillator circuits.
- 17.21 Construct oscillator circuits.
- 17.22 Analyze and troubleshoot oscillator circuits.
- 17.23 Identify and define operating characteristics and applications of cathode ray tubes.
- 17.24 Identify and define operating characteristics and applications of optoelectronic devices.
- 17.25 Set up and operate measuring instruments for analog circuits.

18.0 Demonstrate skills in technical recording--The student will be able to:

- 18.01 Draw and interpret electronic schematics.
- 18.02 Record data and design curves and graphs.
- 18.03 Write reports and make oral presentations.
- 18.04 Maintain test logs.
- 18.05 Make equipment failure reports.
- 18.06 Specify and requisition simple electronic components.
- 18.07 Compose technical letters and memoranda.
- 18.08 Write formal reports of laboratory experiences.
- 18.09 Draft preventive maintenance and calibration procedures.

31.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 31.01 Describe the nature and types of business organizations. SY 1.0
- 31.02 Explain the effect of key organizational systems on performance and quality.
- 31.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 31.04 Explain the impact of the global economy on business organizations.

**Course Number: AVS0090**

**Occupational Completion Point: E**

**Avionics Technical Publications Technician – 180 Hours – SOC Code 49-2091**

23.0 Demonstrate proficiency in avionics radio station regulations and procedures--The student will be able to:

- 23.01 Define repair station related regulatory and standardization agencies and their purposes.
- 23.02 Define repair station certification requirements.
- 23.03 Define requirements for certification of radio repairmen.
- 23.04 Practice proper station operation procedures.
- 23.05 Prepare repair station reports and documentation.

32.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 32.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 32.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 32.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 32.04 Employ mentoring skills to inspire and teach others. LT 5.0

33.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 33.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 33.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 33.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 33.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 33.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 33.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 33.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 33.08 Research the benefits of ongoing professional development. ECD 9.0
- 33.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: AVS0091**

**Occupational Completion Point: F**

**Avionics Installer – 180 Hours – SOC Code 49-2091**

24.0 Demonstrate proficiency in aircraft electrical systems and ground safety--The student will be able to:

- 24.01 Define standard aircraft bus voltage.
- 24.02 Analyze aircraft electrical power generation and charging systems.
- 24.03 Analyze aircraft electrical power control and distribution systems.
- 24.04 Analyze aircraft electrical warning systems.
- 24.05 Analyze aircraft ground handling safety.
- 24.06 Describe and practice aircraft ground handling safety procedures pertaining to avionics maintenance.

25.0 Demonstrate proficiency in line and bench maintenance of airborne communication systems--The student will be able to:

- 25.01 Describe theory of operation of air to ground communication systems.
- 25.02 Determine serviceability through performance checks of avionics communication systems.
- 25.03 Troubleshoot to the component/module level malfunctioning communication systems/equipment.
- 25.04 Repair and return to service air to ground communication systems/equipment.
- 25.05 Analyze and troubleshoot communication transmitter switching and audio distribution circuits and equipment.
- 25.06 Describe the theory of operation of emergency locator transmitters (ELTs).



- 25.07 Perform preventative and regulatory maintenance and performance tests of ELTs.
- 25.08 Troubleshoot defective ELTs, repair and return to service.
- 29.0 Demonstrate proficiency in installing avionics systems--The student will be able to:
  - 29.01 Draw an interconnecting diagram and interconnect an IFR Avionics system for a single engine or light twin aircraft using acceptable methods, techniques and practices.
  - 29.02 Determine proper placement of the various antennas required for an IFR Avionics package on a light twin or single engine aircraft.
  - 29.03 Describe the effects of precipitation static on aircraft radios and standard methods of reduction.
  - 29.04 Compute the dimensions of an ADF Sense antenna for a typical installation.
  - 29.05 Apply the formula for weight and balance computation.
- 30.0 Demonstrate proficiency in the calibration of test equipment--The student will be able to:
  - 30.01 Describe the regulatory requirements for repair station test equipment calibration.
  - 30.02 Calibrate frequency counters/meters.
  - 30.03 Calibrate general-purpose multimeters.
  - 30.04 Calibrate RF voltmeters.
  - 30.05 Calibrate RF powermeters, wattmeters, loads and attenuators.
  - 30.06 Calibrate audio signal generators and power meters.
  - 30.07 Calibrate oscilloscopes.
  - 30.08 Calibrate power supplies.
  - 30.09 Calibrate RF signal generators.
  - 30.10 Calibrate special purpose test sets normally used in an Avionics Repair Station.

**Course Number: AVS0092**

**Occupational Completion Point: G**

**Avionics Communication System Technician – 180 Hours – SOC Code 49-2091**

- 19.0 Demonstrate proficiency in AM and FM transmitters--The student will be able to:
  - 19.01 Define DSB, SSB and FM modulation.
  - 19.02 Draw, analyze and troubleshoot AM and FM RF oscillator circuits.
  - 19.03 Draw, analyze and troubleshoot buffer and multiplier circuits.
  - 19.04 Draw, analyze and troubleshoot RF power amplifier circuits.
  - 19.05 Draw, analyze and troubleshoot AM and FM modulation circuits.
  - 19.06 Draw, analyze and troubleshoot microphone circuits.
  - 19.07 Draw, analyze and troubleshoot balanced modulators and SSB filter circuits.
  - 19.08 Draw, analyze and troubleshoot AM and FM power supply circuits.
  - 19.09 Make power, frequency and modulation measurements of AM and FM transmitters.
  - 19.10 Align and troubleshoot AM and FM transmitters.
  - 19.11 Describe FCC rules pertaining to AM and FM transmitter maintenance and operation.
- 20.0 Demonstrate proficiency in AM and FM receivers--The student will be able to:

- 20.01 Draw, analyze and troubleshoot receiver audio voltage and power amplifiers and speaker/headphone circuits.
  - 20.02 Draw, analyze and troubleshoot AM and FM detector circuits.
  - 20.03 Draw, analyze and troubleshoot AM IF amplifier circuits.
  - 20.04 Draw, analyze and troubleshoot FM IF amplifier and limited circuits.
  - 20.05 Draw, analyze and troubleshoot receiver oscillator and AFC circuits.
  - 20.06 Draw, analyze and troubleshoot RF mixer/hetrodyne circuits.
  - 20.07 Draw, analyze and troubleshoot receiver RF amplifier circuits.
  - 20.08 Draw, analyze and troubleshoot AVC/AGC circuits.
  - 20.09 Draw, analyze and troubleshoot receiver power supplies.
  - 20.10 Make receiver sensitivity, selectivity, bandwidth, image rejection and adjacent channel rejection measurements.
  - 20.11 Align and troubleshoot AM and FM receivers.
- 21.0 Demonstrate proficiency in AM and FM transceivers--The student will be able to:
- 21.01 Analyze and troubleshoot transceiver control, metering and switching circuits.
  - 21.02 Analyze and troubleshoot transceiver frequency synthesizers and phase locked loop circuits.
  - 21.03 Analyze and troubleshoot squelch circuits.
  - 21.04 Align and troubleshoot transceivers.
- 22.0 Demonstrate proficiency in electromagnetic wave emissions--The student will be able to:
- 22.01 Define the radio frequency spectrum.
  - 22.02 Define types and classification of RF emissions.
  - 22.03 Define the characteristics of radio waves.
  - 22.04 Define radio wave propagation method.
  - 22.05 Define the basic types of antennas.
  - 22.06 Draw the voltage and current relationships and radiation patterns for the basic types of antennas.
  - 22.07 Solve signal strength problems and measure signal strength.
  - 22.08 Solve problems pertaining to antenna length, propagation velocity and frequency.
  - 22.09 Define methods for antenna tuning, gain and directivity.
  - 22.10 Define transmission lines in terms of electrical and physical properties.
  - 22.11 Define standing waves, cause and effect, and measure standing wave ratios.
  - 22.12 Define tuned transmission lines and describe applications.
  - 22.13 Draw voltage, current and impedance relationships for tuned transmission lines.
  - 22.14 Compute transmission line losses.
  - 22.15 Construct transmission lines.
  - 22.16 Define waveguides, resonant cavities and their applications.

**Course Number: AVS0093**

**Occupational Completion Point: H**

**Avionics Technician – 180 Hours – SOC Code 49-2091**

- 26.0 Demonstrate proficiency in line and bench maintenance of airborne radio navigation systems and equipment--The student will be able to:

- 26.01 Describe the principles and theory of operation of VHF omnirange receivers, converters and indicators.
  - 26.02 Determine through performance checks, the serviceability of VHF omnirange systems.
  - 26.03 Troubleshoot to the component/module level malfunctioning omnirange systems.
  - 26.04 Repair and return to service omnirange systems equipment.
  - 26.05 Describe the principles and theory of operation of instrument landing systems (ILS).
  - 26.06 Determine through performance checks the serviceability of localizer, glideslope and marker beacon receivers, converters and indicators.
  - 26.07 Troubleshoot to the component/module level malfunctioning ILS systems and equipment.
  - 26.08 Repair and return to service ILS systems and equipment.
  - 26.09 Describe the principles of operation of microwave landing systems.
  - 26.10 Describe the principles and theory of operation of Automatic Direction Finders (ADF).
  - 26.11 Determine through performance checks the serviceability of ADF systems.
  - 26.12 Troubleshoot to the component/module level malfunctioning ADF systems.
  - 26.13 Repair and return to service ADF systems.
  - 26.14 Describe radio navigation systems/equipment interface with other aircraft instruments and systems.
- 27.0 Demonstrate proficiency in line and bench maintenance of airborne radar systems--The student will be able to:
- 27.01 Describe the principles and theory of operation of Air Traffic Control (ATC) transponders and altitude encoders.
  - 27.02 Determine through performance checks the serviceability of ATC transponders and altitude encoders.
  - 27.03 Troubleshoot to the component/module level ATC transponders.
  - 27.04 Repair and return to service ATC transponders.
  - 27.05 Describe the principles and theory of operation and Distance Measurements Equipment (DME).
  - 27.06 Determine through performance checks the serviceability of DME systems.
  - 27.07 Troubleshoot to the component/module level malfunctioning DME systems.
  - 27.08 Repair and return to service DME transponders.
  - 27.09 Describe the principles and basic theory of operation of weather radar systems.
  - 27.10 Describe the basic principles of operation of the 3M/Ryan Stormscope.
- 28.0 Demonstrate proficiency in the principles of operation of area navigation (R-NAV) systems--The student will be able to:
- 28.01 Describe the principles of operation of VHF R-NAV systems (VOR-DME).
  - 28.02 Describe the principles of operation of hyperbolic R-NAV systems (Loran C) (Omega/VAF).

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Heavy Equipment Mechanics  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I470302
CIP Number	0647.030200
Grade Level	30, 31
Standard Length	1800 Hours
Teacher Certification	DIESEL MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031, 49-9098
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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, the following: 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.

## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0101	Diesel Engine Mechanic/Technician Helper	150	49-9098
B	DIM0102	Diesel Electrical and Electronics Technician	300	49-3031
C	DIM0103	Diesel Engine Preventative Maintenance Technician	150	49-3031
D	DIM0104	Diesel Engine Technician	300	49-3031
E	DIM0105	Diesel Brakes Technician	300	49-3031
F	DIM0106	Diesel Heating and Air Conditioning Technician	150	49-3031
G	DIM0107	Diesel Steering and Suspension Technician	150	49-3031
H	DIM0108	Diesel Drivetrain Technician	150	49-3031
I	DIM0110	Diesel Power Train Technician	150	49-3031

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify shop organization, management, and safety requirements.
- 02.0 Demonstrate infection control procedures and practice general shop safety.
- 03.0 Identify the basic diesel components and functions.
- 04.0 Demonstrate the use of basic tools and equipment.
- 05.0 Demonstrate workplace communication skills.
- 06.0 Apply math skills to diesel technology tasks.
- 07.0 Apply scientific principles common to diesel technology operations.
- 08.0 Demonstrate employability skills for diesel technology occupations.
- 09.0 Identify entrepreneurial opportunities in the diesel technology industry.
- 10.0 Demonstrate shop and occupational safety procedures.
- 11.0 Identify principles, assemblies, and systems of engine operation.
- 12.0 Demonstrate the qualifications for employment.
- 13.0 General Electrical Systems Diagnosis
- 14.0 Battery Diagnosis and Repair
- 15.0 Starting System Diagnosis and Repair
- 16.0 Charging System Diagnosis and Repair
- 17.0 Lighting Systems Diagnosis and Repair

- 17.01 Headlights, Daytime Running Lights, Parking, Clearance, Tail, Cab, and Instrument Panel Lights
- 17.02 Stoplights, Turn Signals, Hazard Lights, and Back-up Lights
- 18.0 Gauges and Warning Devices Diagnosis and Repair
- 19.0 Related Electrical Systems
- 20.0 Demonstrate language arts knowledge and skills
- 21.0 Solve problems using critical thinking skills, creativity and innovation.
- 22.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 23.0 Engine System
  - 23.01 Engine
  - 23.02 Fuel System
  - 23.03 Air Induction and Exhaust System
  - 23.04 Cooling System
  - 23.05 Lubrication System
- 24.0 Cab and Hood
  - 24.01 Instruments and Controls
  - 24.02 Safety Equipment
  - 24.03 Hardware
  - 24.04 Heating, Ventilation, & Air Conditioning (HVAC)
- 25.0 Electrical/Electronics
  - 25.01 Battery and Starting Systems
  - 25.02 Charging System
  - 25.03 Lighting System
- 26.0 Frame and Chassis
  - 26.01 Air Brakes
  - 26.02 Hydraulic Brakes
  - 26.03 Drive Train
  - 26.04 Suspension and Steering Systems
  - 26.05 Tires and Wheels
  - 26.06 Frame and Fifth Wheel
- 27.0 Use information technology tools
- 28.0 Describe the importance of professional ethics and legal responsibilities.
- 29.0 Demonstrate personal money-management concepts, procedures, and strategies
- 30.0 General Engine Diagnosis
- 31.0 Cylinder Head and Valve Train Diagnosis and Repair
- 32.0 Engine Block Diagnosis and Repair
- 33.0 Lubrication Systems Diagnosis and Repair
- 34.0 Cooling System Diagnosis and Repair
- 35.0 Air Induction and Exhaust Systems Diagnosis and Repair
- 36.0 Fuel System Diagnosis and Repair
  - 36.01 Fuel Supply System Diagnosis and Repair
  - 36.02 Mechanical Fuel Injection Diagnosis and Repair
  - 36.03 Electronic Fuel Management System Diagnosis and Repair
- 37.0 Engine Brakes
- 38.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 39.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 40.0 Air Supply and Service Systems



- 41.0 Mechanical/Foundation
- 42.0 Parking Brakes
- 43.0 Hydraulic System
- 44.0 Mechanical/Foundation
- 45.0 Power Assist Units
- 46.0 Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)
- 47.0 HVAC Systems Diagnosis, Service, and Repair
- 48.0 A/C System and Component Diagnosis, Service, and Repair
  - 48.01 A/C System - General
  - 48.02 Compressor and Clutch
  - 48.03 Evaporator, Condenser, and Related Components
- 49.0 Heating and Engine Cooling Systems Diagnosis, Service, and Repair
- 50.0 Operating Systems and Related Controls Diagnosis and Repair
  - 50.01 Electrical
  - 50.02 Air/Vacuum/Mechanical
- 51.0 Refrigerant Recovery, Recycling, and Handling
- 52.0 Steering Systems Diagnosis and Repair
  - 52.01 Steering Column
  - 52.02 Steering Units
  - 52.03 Steering Linkage
- 53.0 Suspension Systems Diagnosis and Repair
- 54.0 Wheel Alignment Diagnosis, Adjustment, and Repair
- 55.0 Wheels and Tires Diagnosis and Repair
- 56.0 Frame Service and Repair
- 57.0 Clutch Diagnosis and Repair
- 58.0 Transmission Diagnosis and Repair
- 59.0 Driveshaft and Universal Joint Diagnosis and Repair
- 60.0 Drive Axle Diagnosis and Repair
- 61.0 Demonstrate shop and occupational safety procedures.
- 62.0 Identify the requirements for maintaining and repairing track systems.
- 63.0 Maintain and repair power train systems and components.
- 64.0 Troubleshoot and repair differentials, final drives and drive lines.
- 65.0 Demonstrate the qualifications for employment.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Heavy Equipment Mechanics  
PSAV Number: I470302**

**Course Number: DIM0101  
Occupational Completion Point: A  
Diesel Engine Mechanic/Technician Helper – 150 Hours – SOC Code 49-9098**

- 01.0 Identify shop organization, management, and safety requirements--The student will be able to:
- 01.01 Identify basic shop organization and management regulations.
  - 01.02 Identify required shop-safety practices.
  - 01.03 Identify and describe shop-maintenance procedures, including precautions for handling and storing work-related chemicals and hazardous materials.
- 02.0 Demonstrate infection control procedures and practice general shop safety--The student will be able to:
- 02.01 Understand how blood borne pathogens are spread and how to clean contamination on environmental surfaces.
  - 02.02 Identify cleaning solutions that will kill the AIDS virus on environmental surfaces.
  - 02.03 Practice general shop safety.
- 03.0 Identify the basic diesel components and functions--The student will be able to:
- 03.01 Identify types of bearings and their uses.
  - 03.02 Identify seals, gaskets, and fasteners.
  - 03.03 Identify drive power train components and functions.
  - 03.04 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility
- 04.0 Demonstrate the use of basic tools and equipment--The student will be able to:
- 04.01 Identify and use the following correctly and safely:
    - a. Basic hand tools
    - b. Basic welding tools and equipment
    - c. Power tools
    - d. Measuring and precision tools
  - 04.02 Read a digital multimeter
- 05.0 Demonstrate workplace communication skills--The student will be able to:
- 05.01 Locate information in technical literature, such as a manufacturer's manual, in both print and computer versions.
  - 05.02 Read, interpret, and apply information from parts and service manuals.
  - 05.03 Read and follow written and oral instructions.

- 05.04 Read and interpret graphs, charts, diagrams, and tables commonly used in the diesel technology industry.
  - 05.05 Answer and ask questions coherently and concisely.
  - 05.06 Use basic keyboarding and computer skills
  - 05.07 Use industry-related computer software.
  - 05.08 Interpret technical specifications information and diagnose problems, both verbally and in writing.
  - 05.09 Solve basic diesel technology problems by combining knowledge of diesel systems with technical information and diagnostic data.
  - 05.10 Complete accurately the required information for journals, repair orders, invoices, time cards, job sheets, and forms.
  - 05.11 Demonstrate telephone and interpersonal communication skills to accurately and courteously exchange information with customers, co-workers, and supervisors.
- 06.0 Apply math skills to diesel technology tasks --The student will be able to:
- 06.01 Apply math skills commonly required for performing job duties in diesel technology occupations.
    - a. Recognize, identify, and make metric conversions.
    - b. Solve problems for volume, weight, areas, circumference, and perimeter measurements for rectangles, squares, and cylinders.
    - c. Measure tolerance (s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
    - d. Add, subtract, multiply, and divide using fractions, decimals, and whole numbers.
  - 06.02 Determine the correct purchase price, including sales tax, for a materials list containing a minimum of six items.
  - 06.03 Calculate federal, state, and local taxes.
  - 06.04 Explain industry time standards, including the use of flat-rate information.
- 07.0 Apply scientific principles common to diesel technology operations--The student will be able to:
- 07.01 Explain molecular action caused by temperature extremes, chemical reaction, and moisture content
  - 07.02 Interpret and draw reasonable conclusions from information provided in graphs, scales, and gauges.
  - 07.03 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 07.04 Identify pressure measurement in terms of pounds per square inch (PSI), inches of mercury, and kilopascal (KPA).
- 08.0 Demonstrate employability skills for diesel technology occupations--The student will be able to:
- 08.01 Describe the field of diesel technology, including working conditions and career opportunities.
  - 08.02 Identify work habits of successful employees concerning:
    - a. Quality of work
    - b. Work hours and schedule

- c. Actions, initiative, teamwork, dependability, and responsible decision making
  - d. Self-control, responses to criticism, and relationships with customers and supervisors
  - e. Time management, cost effectiveness, and fair pricing
  - f. Personal hygiene, health habits, and professional appearance
  - g. Driving records, drug-free workplace, and industry policies
  - h. Methods of changing jobs
- 08.03 Conduct a job search and identify advanced training opportunities in diesel technology occupations, including specialized industry training.
- 08.04 Obtain information about different jobs on training and licensing requirements, bonding requirements, equipment needs, responsibilities, pay, benefits, work conditions, risks, and opportunities for advancement.
- 08.05 Identify information and documents that may be required when applying for a job.
- 08.06 Complete a job-application form correctly.
- 08.07 Demonstrate competence in job-interview techniques.
- 08.08 Demonstrate a knowledge of the Florida "Right-to-Know" law, Florida Statutes, Chapter 442.
- 09.0 Identify entrepreneurial opportunities in the diesel technology industry--The student will be able to:
- 09.01 Describe the meaning of entrepreneurship.
  - 09.02 Describe the importance of entrepreneurship to the American economy.
  - 09.03 Describe types of diesel technology businesses and list the advantages, disadvantages, and risks of business ownership.
  - 09.04 Identify the necessary personal characteristics of a successful entrepreneur.
  - 09.05 Identify the business skills needed to operate a small business efficiently and effectively.
  - 09.06 Compare opportunities for starting a diesel technology business to other job opportunities in the industry.
- 10.0 Demonstrate shop and occupational procedures --The student will be able to:
- 10.01 10.01 Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 10.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and the handling, storage, and disposal of chemicals and hazardous materials.
- 11.0 Identify principles, assemblies, and systems of engine operation--The student will be able to:
- 11.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine
  - 11.02 Identify engine assemblies and systems.
  - 11.03 Explain the operating principles of two-and-four-stroke-cycle engines.
  - 11.04 Identify the equipment of two-and-four-stroke-cycle engines.
  - 11.05 Identify governor types and their operating principles.
- 12.0 Demonstrate the qualifications for employment--The student will be able to:

- 12.01 Demonstrate the shop organization, management, and safety requirements for a diesel engine technician.
- 12.02 Demonstrate the use of tools and equipment required for a diesel engine technician.
- 12.03 Demonstrate workplace communications skills required by diesel engine technician.
- 12.04 Demonstrate the application of math and science principles required for a diesel engine technician's job tasks.
- 12.05 Demonstrate employability skills as a diesel engine technician.

**Course Number: DIM0102**

**Occupational Completion Point: B**

**Diesel Electrical and Electronics Technician – 300 Hours – SOC Code 49-3031**

13.0 General electrical systems diagnosis --The student will be able to:

- 13.01 Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams.
- 13.02 Check continuity in electrical/electronic circuits using appropriate test equipment.
- 13.03 Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM).
- 13.04 Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) or clamp-on ammeter.
- 13.05 Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM).
- 13.06 Find shorts, grounds, and opens in electrical/electronic circuits.
- 13.07 Diagnose parasitic (key-off) battery drain problems.
- 13.08 Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.
- 13.09 Inspect and test spike suppression diodes/resistors; replace as needed.

14.0 Battery diagnosis and repair--The student will be able to:

- 14.01 Perform battery load test; determine needed action.
- 14.02 Determine battery state of charge using an open circuit voltage test.
- 14.03 Inspect, clean, and service battery; replace as needed.
- 14.04 Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.
- 14.05 Charge battery using slow or fast charge method as appropriate.
- 14.06 Inspect, test, and clean battery cables and connectors; repair or replace as needed.
- 14.07 Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures.
- 14.08 Perform battery capacitance test; determine needed action.

15.0 Starting system diagnosis and repair--The student will be able to:

- 15.01 Perform starter current draw test; determine needed action.
- 15.02 Perform starter circuit cranking voltage and voltage drop tests; determine needed action.

- 15.03 Inspect, test, and replace components (key switch, push button and/or magnetic switch) and wires in the starter control circuit.
- 15.04 Inspect, test, and replace starter relays and solenoids/switches.
- 15.05 Remove and replace starter; inspect flywheel ring gear or flex plate.

16.0 Charging system diagnosis and repair--The student will be able to:

- 16.01 Diagnose instrument panel mounted volt meters and/or indicator lamps that show a no charge, low charge, or overcharge condition; determine needed action.
- 16.02 Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action.
- 16.03 Inspect, adjust, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.
- 16.04 Perform charging system voltage and amperage output test; determine needed action.
- 16.05 16.05. Perform charging circuit voltage drop tests; determine needed action.
- 16.06 Remove and replace alternator.
- 16.07 16.07. Inspect, repair, or replace connectors and wires in the charging circuit.
- 16.08 Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action.

17.0 Lighting Systems Diagnosis And Repair

17.01 Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights --The student will be able to:

- 17.01.01 Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.
- 17.01.02 Test, aim, and replace headlights.
- 17.01.03 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed.
- 17.01.04 Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays and wires of parking, clearance, and taillight circuits; repair or replace as needed.
- 17.01.05 Inspect and test instrument panel light circuit switches, relays, bulbs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed.
- 17.01.06 Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed.
- 17.01.07 Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.

17.02 Stoplights, turn signals, hazard lights, and back-up lights --The student will be able to:

- 17.02.01 Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed.

- 17.02.02 Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed.
- 17.02.03 Inspect, test, and adjust backup lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, and wires; repair or replace as needed.

18.0 Gauges and warning devices diagnosis and repair --The student will be able to:

- 18.01 Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action.
- 18.02 Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action.
- 18.03 Diagnose the cause of data bus-driven gauge malfunctions; determine needed action.
- 18.04 Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed.
- 18.05 Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed.
- 18.06 Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.

19.0 Related electrical systems --The student will be able to:

- 19.01 Diagnose the cause of constant, intermittent, or no horn operation; determine needed action.
- 19.02 Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed.
- 19.03 Diagnose the cause of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action.
- 19.04 Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed.
- 19.05 Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed.
- 19.06 Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed.
- 19.07 Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed.
- 19.08 Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, and wires; repair or replace as needed.
- 19.09 Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed.
- 19.10 Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action.
- 19.11 Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed.
- 19.12 Inspect block heaters; determine needed repairs.

- 19.13 Inspect and test cruise control electrical components; repair or replace as needed.
  - 19.14 Inspect and test engine cooling fan electrical control components; repair or replace as needed.
  - 19.15 Diagnose cause of data buss communication problems; determine needed action.
- 20.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 20.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 20.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 20.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 21.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 21.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 21.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 21.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 21.04 Conduct technical research to gather information necessary for decision-making.PS 4.0
- 22.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 22.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 22.02 Explain emergency procedures to follow in response to workplace accidents.
  - 22.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: DIM0103**

**Occupational Completion Point: C**

**Diesel Engine Preventative Maintenance Technician – 150 Hours – SOC Code 49-3031**

23.0 Engine System

23.01 Engine -- The student will be able to:

- 23.01.1 Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.
- 23.01.2 Inspect vibration damper.
- 23.01.3 Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.
- 23.01.4 Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off).
- 23.01.5 Inspect engine mounts for looseness and deterioration.



- 23.01.6 Check engine for oil, coolant, air, fuel and exhaust leaks (Engine Running).
- 23.01.7 Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM).

23.02 Fuel system -- The student will be able to:

- 23.02.1 Check fuel tanks, mountings, lines, caps, and vents.
- 23.02.2 Inspect throttle linkages and return springs.
- 23.02.3 Drain water from fuel system.
- 23.02.4 Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.

23.03 Air induction and exhaust system--The student will be able to:

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

23.04 Cooling system -- The student will be able to:

- 23.04.1 Check operation of fan clutch.
- 23.04.2 Inspect radiator (including air flow restriction, leaks, and damage) and mountings.
- 23.04.3 Inspect fan assembly and shroud.
- 23.04.4 Pressure test cooling system and radiator cap.
- 23.04.5 Inspect coolant hoses and clamps.
- 23.04.6 Inspect coolant recovery system.
- 23.04.7 Check coolant for contamination, supplemental coolant additives (SCA) concentration, and protection level (freeze point).
- 23.04.8 Service coolant filter/conditioner.
- 23.04.9 Inspect water pump for leaks and bearing play.

23.05 Lubrication system -- The student will be able to:

- 23.05.1 Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.
- 23.05.2 Take an engine oil sample.

## 24.0 Cab and Hood

### 24.01 Instruments and controls -- The student will be able to:

- 24.01.1 Inspect key condition and operation of ignition switch.
- 24.01.2 Check warning indicators.
- 24.01.3 Check instruments; record oil pressure and system voltage.
- 24.01.4 Check mechanical, electronic, and emergency shut down operation.
- 24.01.5 Check mechanical and electronic engine speed controls.
- 24.01.6 Check heater, ventilation, and air conditioning (HVAC) controls.
- 24.01.7 Check operation of all accessories.
- 24.01.8 Using diagnostic tool or on-board diagnostic system; extract engine monitoring information.

### 24.02 Safety equipment -- The student will be able to:

- 24.02.1 Check operation of electric/air horns and back-up warning devices.
- 24.02.2 Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals.
- 24.02.3 Inspect seat belts and sleeper restraints.
- 24.02.4 Inspect wiper blades and arms.

### 24.03 Hardware -- The student will be able to:

- 24.03.1 Check wiper and washer operation.
- 24.03.2 Inspect windshield glass for cracks or discoloration; check sun visor.
- 24.03.3 Check seat condition, operation, and mounting.
- 24.03.4 Check door glass and window operation.
- 24.03.5 Inspect steps and grab handles.
- 24.03.6 Inspect mirrors, mountings, brackets, and glass.
- 24.03.7 Record all observed physical damage.
- 24.03.8 Lubricate all cab and hood grease fittings.
- 24.03.9 Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.
- 24.03.10 Inspect cab mountings, hinges, latches, linkages and ride height; service as needed.
- 24.03.11 Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed.

### 24.04 Heating, ventilation, & air conditioning (HVAC) -- The student will be able to:

- 24.04.1 Inspect A/C condenser and lines for condition and visible leaks; check mountings.
- 24.04.2 Inspect A/C compressor and lines for condition and visible leaks; check mountings.
- 24.04.3 Check A/C system condition and operation; check A/C monitoring system, if applicable.

24.04.4 Check HVAC air inlet filters and ducts; service as needed.

25.0 Electrical/Electronics

25.01 Battery and starting systems -- The student will be able to:

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

25.02 Charging system -- The student will be able to:

- 25.02.1 Inspect alternator, mountings, wiring and wiring routing; determine needed action.
- 25.02.2 Perform alternator current output test.
- 25.02.3 Perform alternator voltage output test.

25.03 Lighting system -- The student will be able to:

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

26.0 Frame and Chassis

26.01 Air brakes -- The student will be able to:

- 26.01.1 Check parking brake operation.
- 26.01.2 Record air governor cut-out setting (PSI).
- 26.01.3 Check air drier drain valve operation.
- 26.01.4 Check air system for leaks (brakes released).
- 26.01.5 Check air system for leaks (brakes applied).
- 26.01.6 Test one-way and double-check valves.
- 26.01.7 Check low air pressure warning devices.
- 26.01.8 Check air governor cut-in pressure.
- 26.01.9 Check emergency (spring) brake control/modulator valve, if applicable.
- 26.01.10 Check tractor protection valve.
- 26.01.11 Test air pressure build-up time.
- 26.01.12 Inspect coupling air lines, holders, and gladhands.
- 26.01.13 Check brake chambers and air lines for secure mounting and damage.
- 26.01.14 Service air drier.

- 26.01.15 Inspect and record brake lining/pad condition, thickness, and contamination.
- 26.01.16 Inspect and record condition of brake drums/rotors.
- 26.01.17 Check operation of brake manual slack adjusters; adjust as needed.
- 26.01.18 Check operation and adjustment of brake automatic slack adjusters.
- 26.01.19 Lubricate all brake component grease fittings.
- 26.01.20 Check condition and operation of hand brake (trailer) control valve.
- 26.01.21 Perform antilock brake system (ABS) operational system self-test.
- 26.01.22 Drain air tanks and check for contamination.
- 26.01.23 Check condition of pressure relief (safety) valves

26.02 Hydraulic brakes -- The student will be able to:

- 26.02.1 Check master cylinder fluid level and condition.
- 26.02.2 Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.
- 26.02.3 Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.
- 26.02.4 Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift).
- 26.02.5 Inspect wheel cylinders/calipers for leakage and damage.
- 26.02.6 Inspect power brake booster(s), hoses; and check/control valves; check power brake booster, reservoir fluid level and condition.
- 26.02.7 Inspect and record brake lining/pad condition and thickness, and contamination.
- 26.02.8 Inspect and record condition of brake drums/rotors.
- 26.02.9 Adjust drum brakes.

26.03 Drive train -- The student will be able to:

- 26.03.1 Check operation of clutch, clutch brake, and gearshift.
- 26.03.2 Check clutch linkage/cable for looseness or binding, if applicable.
- 26.03.3 Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.
- 26.03.4 Check clutch adjustment; adjust as needed.
- 26.03.5 Check transmission case, seals, filter, hoses, and cooler for cracks and leaks.
- 26.03.6 Inspect transmission breather.
- 26.03.7 Inspect transmission mounts.
- 26.03.8 Check transmission oil level, type, and condition.
- 26.03.9 Inspect U-joints, yokes, drive lines, and center bearings for looseness, damage, and proper phasing.
- 26.03.10 Inspect axle housing(s) for cracks and leaks.

- 26.03.11 Inspect axle breather(s).
- 26.03.12 Lubricate all drive train grease fittings.
- 26.03.13 Check drive axle(s) oil level, type, and condition.
- 26.03.14 Change drive axle(s) oil and filter; check and clean magnetic plugs.
- 26.03.15 Check two-speed axle unit operation and oil level.
- 26.03.16 Change transmission oil and filter; check and clean magnetic plugs.
- 26.03.17 Check interaxle differential lock operation.
- 26.03.18 Check range shift operation.

26.04 Suspension and steering systems -- The student will be able to:

- 26.04.1 Check steering wheel operation for free play or binding.
- 26.04.2 Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level.
- 26.04.3 Change power steering fluid and filter.
- 26.04.4 Inspect steering gear for leaks and secure mounting.
- 26.04.5 Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, linkage, and linkage-assist power steering cylinders.
- 26.04.6 Check king pin wear.
- 26.04.7 Check wheel bearings for looseness and noise.
- 26.04.8 Check oil level and condition in all non-drive hubs; check for leaks.
- 26.04.9 Remove and inspect wheel bearings; reassemble and adjust.
- 26.04.10 Inspect springs, hangers, shackles, spring U-bolts, and insulators.
- 26.04.11 Inspect shock absorbers for leaks and secure mounting.
- 26.04.12 Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.
- 26.04.13 Check and record suspension ride height.
- 26.04.14 Lubricate all suspension and steering grease fittings.
- 26.04.15 Check toe adjustment.
- 26.04.16 Check tandem axle alignment and spacing.
- 26.04.17 Check axle locating components (radius, torque, and/or track rods).

26.05 Tires and wheels -- The student will be able to:

- 26.05.1 Inspect tires for irregular wear patterns and proper mounting of directional tires.
- 26.05.2 Inspect tires for cuts, cracks, bulges, and sidewall damage.
- 26.05.3 Inspect valve caps and stems; replace as needed.
- 26.05.4 Measure and record tread depth; probe for imbedded debris.
- 26.05.5 Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications.
- 26.05.6 Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed.
- 26.05.7 Retorque lugs in accordance with manufacturer's specifications.

- 26.05.8 Inspect wheels and spacers for cracks or damage.
- 26.05.9 Check tire matching (diameter and tread) on dual tire installations.

26.06 Frame and fifth wheel -- The student will be able to:

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

27.0 Use information technology tools. -- The students will be able to:

- 27.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 27.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 27.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 27.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

28.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:

- 28.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 28.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 28.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 28.04 Interpret and explain written organizational policies and procedures. ELR 2.0

29.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- 29.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 29.02 Describe the effect of money management on personal and career goals. FL 3.0
- 29.03 Develop a personal budget and financial goals. FL3.1
- 29.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 29.05 Maintain financial records. FL3.3
- 29.06 Read and reconcile financial statements. FL3.4
- 29.07 Research, compare and contrast investment opportunities.

**Course Number: DIM0104**

**Occupational Completion Point: D**

**Diesel Engine Technician – 300 Hours – SOC Code 49-3031**

30.0 General engine diagnosis -- The student will be able to:

- 30.01 Inspect fuel, oil, and coolant levels and condition, and consumption; determine needed action.
  - 30.02 Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action.
  - 30.03 Interpret engine noises; determine needed action.
  - 30.04 Observe engine exhaust smoke color and quantity; determine needed action.
  - 30.05 Perform air intake system restriction and leakage tests; determine needed action.
  - 30.06 Perform intake manifold pressure (boost) test; determine needed action.
  - 30.07 Perform exhaust back pressure test; determine needed action.
  - 30.08 Perform crankcase pressure test; determine needed action.
  - 30.09 Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.
  - 30.10 Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action.
  - 30.11 Diagnose engine vibration problems; determine needed action.
  - 30.12 Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action.
  - 30.13 Perform cylinder compression test; determine needed action.
- 31.0 Cylinder head and valve train diagnosis and repair--The student will be able to:
- 31.01 Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly.
  - 31.02 Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action.
  - 31.03 Inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; determine needed action.
  - 31.04 Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action.
  - 31.05 Measure valve head height relative to deck, valve face-to-seat contact; determine needed action.
  - 31.06 Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action.
  - 31.07 Inspect and adjust valve bridges (crossheads) and guides; perform needed action.
  - 31.08 Reassemble cylinder head.
  - 31.09 Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash.
  - 31.10 Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; perform needed action.
  - 31.11 Inspect cam followers; perform needed action.
  - 31.12 Adjust valve clearance.
- 32.0 Engine block diagnosis and repair -- The student will be able to:
- 32.01 Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings.
  - 32.02 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.
- 32.03 Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action.
- 32.04 Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action.
- 32.05 Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion).
- 32.06 Inspect in-block camshaft bearings for wear and damage; determine needed action.
- 32.07 Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play.
- 32.08 Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passages; check passage plugs; measure journal diameter; determine needed action.
- 32.09 Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play.
- 32.10 Inspect, install, and time gear train; measure gear backlash; determine needed action.
- 32.11 Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action.
- 32.12 Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons.
- 32.13 Assemble pistons and connecting rods; install in block; install rod bearings and check clearances.
- 32.14 Check condition of piston cooling jets (nozzles); determine needed action.
- 32.15 Inspect and measure crankshaft vibration damper; determine needed action.
- 32.16 Inspect, install, and align flywheel housing.
- 32.17 Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.
- 33.0 Lubrication systems diagnosis and repair -- The student will be able to:
- 33.01 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action.
- 33.02 Check engine oil level, condition, and consumption; determine needed action.
- 33.03 Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action.
- 33.04 Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.
- 33.05 Inspect, clean, and test oil cooler and components; determine needed action.
- 33.06 Inspect turbocharger lubrication system; determine needed action.
- 33.07 Determine proper lubricant and perform oil and filter change.
- 34.0 Cooling system diagnosis and repair -- The student will be able to:
- 34.01 Check engine coolant type, level, condition, and consumption; determine needed action.
- 34.02 Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action.



- 34.03 Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.
  - 34.04 Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.
  - 34.05 Test coolant for freeze protection and additive package concentration; adjust as needed.
  - 34.06 Recover, flush, and refill with recommended coolant/additive package; bleed cooling system.
  - 34.07 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.
  - 34.08 Inspect water pump and hoses; replace as needed.
  - 34.09 Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action.
  - 34.10 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.
- 35.0 Air induction and exhaust systems diagnosis and repair -- The student will be able to:
- 35.01 Inspect turbocharger(s), wastegate, and piping systems; determine needed action.
  - 35.02 Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed.
  - 35.03 Remove and reinstall turbocharger/wastegate assembly.
  - 35.04 Inspect intake manifold, gaskets, and connections; replace as needed.
  - 35.05 Inspect, clean, and test charge air cooler assemblies; replace as needed.
  - 35.06 Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed.
  - 35.07 Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.
- 36.0 Fuel System Diagnosis And Repair
- 36.01 Fuel supply system diagnosis and repair -- The student will be able to:
- 36.01.1 Check fuel level, quality, and consumption; determine needed action.
  - 36.01.2 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.
  - 36.01.3 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.
  - 36.01.4 Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.
  - 36.01.5 Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.
- 36.02 Mechanical fuel injection diagnosis and repair -- The student will be able to:

- 36.02.1 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time a distributor (rotary) type injection pump; determine needed action.
  - 36.02.2 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time an in-line type injection pump; determine needed action.
  - 36.02.3 Inspect and adjust throttle control linkage; determine needed action.
  - 36.02.4 Inspect air/fuel ratio control systems; determine needed action.
  - 36.02.5 Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action.
  - 36.02.6 Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed.
- 36.03 Electronic fuel management system diagnosis and repair--The student will be able to:
- 36.03.1 Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action.
  - 36.03.2 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action.
  - 36.03.3 Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).
  - 36.03.4 Inspect and replace electrical connector terminals, seals, and locks.
  - 36.03.5 Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed.
  - 36.03.6 Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters.
  - 36.03.7 Inspect, test, and adjust electronic unit injectors (EUI); determine needed action.
  - 36.03.8 Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable).
  - 36.03.9 Perform cylinder contribution test utilizing recommended electronic diagnostic tool.
  - 36.03.10 Perform engine timing sensor calibration (if applicable).
  - 36.03.11 Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action.
  - 36.03.12 Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI)-high pressure oil supply and control system; determine needed action.
  - 36.03.13 Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action.

- 36.03.14 Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action.
- 36.03.15 Perform on-engine inspections and tests on common rail type injection systems; determine needed action.

37.0 Engine brakes -- The student will be able to:

- 37.01 Inspect and adjust engine compression/exhaust brakes; determine needed action.
- 37.02 Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed.
- 37.03 Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed.

38.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 38.01 Describe the nature and types of business organizations. SY 1.0
- 38.02 Explain the effect of key organizational systems on performance and quality.
- 38.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 38.04 Explain the impact of the global economy on business organizations.

39.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 39.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 39.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 39.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 39.04 Employ mentoring skills to inspire and teach others. LT 5.0

**Course Number: DIM0105**

**Occupational Completion Point: E**

**Diesel Brakes Technician –300 Hours – SOC Code 49-3031**

### **Air Brakes Diagnosis and Repair**

40.0 Air supply and service systems -- The student will be able to:

- 40.01 Diagnose poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determine needed action.
- 40.02 Check air system build-up time; determine needed action.
- 40.03 Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action.
- 40.04 Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed.
- 40.05 Inspect compressor drive gear and coupling; replace as needed.
- 40.06 Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.

- 40.07 Inspect and test system pressure controls: governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings; replace as needed.
  - 40.08 Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed.
  - 40.09 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.
  - 40.10 Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed.
  - 40.11 Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed.
  - 40.12 Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed.
  - 40.13 Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.
  - 40.14 Inspect and test brake relay valve; replace as needed.
  - 40.15 Inspect and test quick release valves; replace as needed.
  - 40.16 Inspect and test front and rear axle limiting (proportioning) valves; replace as needed.
  - 40.17 Inspect and test tractor protection valve; replace as needed.
  - 40.18 Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed.
  - 40.19 Inspect and test low pressure warning devices, wiring, and connectors; replace as needed.
  - 40.20 Inspect and test air pressure gauges, lines, and fittings; replace as needed.
- 41.0 Mechanical/foundation -- The student will be able to:
- 41.01 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.
  - 41.02 Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed.
  - 41.03 Inspect and service manual and automatic slack adjusters; perform needed action.
  - 41.04 Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs; replace as needed
  - 41.05 Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs.
  - 41.06 Inspect and measure brake shoes, linings, or pads; perform needed action.P-1
  - 41.07 Inspect and measure brake drums or rotors; perform needed action.
- 42.0 Parking brakes -- The student will be able to:
- 42.01 Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.
  - 42.02 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed.
  - 42.03 Inspect and test parking (spring) brake application and release valve; replace as needed.

- 42.04 Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations.

### **Hydraulic Brakes Diagnosis and Repair**

#### 43.0 Hydraulic system -- The student will be able to:

- 43.01 Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action.
- 43.02 Check and adjust brake pedal pushrod length.
- 43.03 Inspect and test master cylinder for internal/external leaks and damage; replace as needed.
- 43.04 Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed.
- 43.05 Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed.
- 43.06 Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed.
- 43.07 Inspect and clean wheel cylinders; replace as needed.
- 43.08 Inspect and clean disc brake caliper assemblies; replace as needed.
- 43.09 Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type.
- 43.10 Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed.

#### 44.0 Mechanical/foundation -- The student will be able to:

- 44.01 Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action.
- 44.02 Inspect and measure brake drums and rotors; perform needed action.
- 44.03 Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action.
- 44.04 Inspect and measure disc brake pads/linings; inspect mounting hardware; perform needed action.
- 44.05 Check parking brake operation; inspect parking brake applications and holding devices; adjust and replace as needed.

#### 45.0 Power assist units -- The student will be able to:

- 45.01 Diagnose poor stopping problems caused by the brake assist (booster) system; determine needed action.
- 45.02 Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type.
- 45.03 Check emergency (back-up, reserve) brake assist system.

#### 46.0 Air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC) -- The student will be able to:

- 46.01 Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action.

- 46.02 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action.
- 46.03 Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action.
- 46.04 Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action.
- 46.05 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).
- 46.06 Bleed the ABS hydraulic circuits following manufacturers' procedures.
- 46.07 Observe automatic traction control (ATC) warning light operation; determine needed action.
- 46.08 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.

**Course Number: DIM0106****Occupational Completion Point: F****Diesel Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3031**

- 47.0 HVAC systems diagnosis, service, and repair -- The student will be able to:
  - 47.01 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action.
  - 47.02 Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action.
  - 47.03 Identify system type and components (cycling clutch orifice tube - CCOT, expansion valve) and conduct performance test(s) on HVAC systems; determine needed action.
- 48.0 A/C System and Component Diagnosis, Service, and Repair
  - 48.01 A/C system – general -- The student will be able to:
    - 48.01.1 Diagnose the cause of temperature control problems in the A/C system; determine needed action.
    - 48.01.2 Identify refrigerant type and check for contamination; determine needed action.
    - 48.01.3 Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action.
    - 48.01.4 Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action.
    - 48.01.5 Perform A/C system leak test; determine needed action.
    - 48.01.6 Evacuate A/C system using appropriate equipment.
    - 48.01.7 Internally clean contaminated A/C system components and hoses.
    - 48.01.8 Charge A/C system with refrigerant.
    - 48.01.9 Identify lubricant type needed for system application.
  - 48.02 Compressor and clutch -- The student will be able to:

- 48.02.1 Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action.
- 48.02.2 Inspect, test, and replace A/C system pressure, thermal and electronic protection devices.
- 48.02.3 Inspect, and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment.
- 48.02.4 Inspect, test, service, and replace A/C compressor clutch components or assembly.
- 48.02.5 Inspect and correct A/C compressor lubricant level (if applicable).
- 48.02.6 Inspect, test, and replace A/C compressor.
- 48.02.7 Inspect, repair, or replace A/C compressor mountings and hardware.

48.03 Evaporator, condenser, and related components -- The student will be able to:

- 48.03.1 Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses.
- 48.03.2 Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action.
- 48.03.3 Inspect A/C condenser for proper air flow.
- 48.03.4 Inspect and test A/C system condenser and mountings; determine needed action.
- 48.03.5 Inspect and replace receiver/drier or accumulator/drier.
- 48.03.6 Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action.
- 48.03.7 Inspect and replace orifice tube.
- 48.03.8 Inspect and test cab/sleeper evaporator core; determine needed action.
- 48.03.9 Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter.
- 48.03.10 Identify and inspect A/C system service ports (gauge connections); determine needed action.
- 48.03.11 Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action.

49.0 Heating and engine cooling systems diagnosis, service, and repair -- The student will be able to:

- 49.01 Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action.
- 49.02 Diagnose window fogging problems; determine needed action.
- 49.03 Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action.
- 49.04 Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action.
- 49.05 Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action.
- 49.06 Inspect water pump for leaks and bearing play; determine needed action.

- 49.07 Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs.
  - 49.08 Recover, flush and refill with recommended coolant/additive package; bleed cooling system.
  - 49.09 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 shut-off valves; determine needed action.
  - 49.10 Inspect and flush heater core; determine needed action.
- 50.0 Operating Systems and Related Controls Diagnosis and Repair
- 50.01 Electrical -- The student will be able to:
- 50.01.1 Diagnose the cause of failures in HVAC electrical control systems; determine needed action.
  - 50.01.2 Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action.
  - 50.01.3 Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action.
  - 50.01.4 Inspect and test A/C-related electronic engine control systems; determine needed action.
  - 50.01.5 Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors wiring, and protection devices; determine needed action.
  - 50.01.6 Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action.
  - 50.01.7 Inspect and test HVAC system electrical control panel assemblies; determine needed action.
- 50.02 Air/vacuum/mechanical -- The student will be able to:
- 50.02.1 Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action.
  - 50.02.2 Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action.
  - 50.02.3 Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action.
  - 50.02.4 Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action.
  - 50.02.5 Inspect and test HVAC system vacuum reservoir(s), check valve(s), and restrictors; determine needed action.
  - 50.02.6 Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action.
- 51.0 Refrigerant recovery, recycling, and handling -- The student will be able to:



**NOTE: Tasks 1 through 5 should be accomplished in accordance with published EPA and appropriate SAE "J" standards for R-12, R-134a, and EPA approved refrigerant blends.**

- 51.01 Maintain and verify correct operation of certified equipment.
- 51.02 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.
- 51.03 Recycle refrigerant.
- 51.04 Handle, label, and store refrigerant.
- 51.05 Test recycled refrigerant for non-condensable gases.

**Course Number: DIM0107**

**Occupational Completion Point: G**

**Diesel Steering and Suspension Technician – 150 Hours – SOC Code 49-3031**

52.0 Steering Systems Diagnosis and Repair

52.01 Steering column -- The student will be able to:

- 52.01.1 Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action.
- 52.01.2 Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action.
- 52.01.3 Check and adjust cab mounting and ride height.
- 52.01.4 Center the steering wheel as needed.
- 52.01.5 Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures.

52.02 Steering units -- The student will be able to:

- 52.02.1 Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed action.
- 52.02.2 Determine recommended type of power steering fluid; check level and condition; determine needed action.
- 52.02.3 Flush and refill power steering system; purge air from system.
- 52.02.4 Perform power steering system pressure, temperature, and flow tests; determine needed action.
- 52.02.5 Inspect, service, or replace power steering reservoir including filter, seals, and gaskets.
- 52.02.6 Inspect, and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.
- 52.02.7 Inspect, replace as required, power steering pump drive gear and coupling.
- 52.02.8 Inspect, adjust, or replace power steering pump, mountings, and brackets.
- 52.02.9 Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings.
- 52.02.10 Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system).

- 52.02.11 Inspect, adjust, repair, or replace integral type power steering gear and mountings.
- 52.02.12 Adjust manual and automatic steering gear poppet/relief valves.

52.03 Steering linkage -- The student will be able to:

- 52.03.1 Inspect and align pitman arm; replace as needed.
- 52.03.2 Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed.
- 52.03.3 Inspect steering arm and levers, and linkage pivot joints; replace as needed.
- 52.03.4 Inspect clamps and retainers on cross tube/relay rod/centerline/tie rod; position or replace as needed.
- 52.03.5 Check and adjust wheel stops.
- 52.03.6 Lubricate steering linkage joints as needed.

53.0 Suspension systems diagnosis and repair -- The student will be able to:

- 53.01 Inspect front axles, U-bolts, and nuts; determine needed action.
- 53.02 Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action.
- 53.03 Inspect shock absorbers, bushings, brackets, and mounts; replace as needed. Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action. Inspect torque arms, bushings, and mounts; determine needed action. Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action.
- 53.04 Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed.
- 53.05 Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed.
- 53.06 Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed.
- 53.07 Measure vehicle ride height; determine needed action.
- 53.08 Diagnose rough ride problems; determine needed action.

54.0 Wheel alignment diagnosis, adjustment, and repair -- The student will be able to:

- 54.01 Diagnose vehicle wandering, pulling, shimmy, hard steering and off-center steering wheel problem(s); adjust and repair as needed.
- 54.02 Check camber; determine needed action.
- 54.03 Check caster; adjust as needed.
- 54.04 Check toe; adjust as needed.
- 54.05 Check rear axle(s) alignment (thrust line/centerline) and tracking; adjust or repair as needed.
- 54.06 Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action.
- 54.07 Check front axle alignment (centerline); adjust or repair as needed.

55.0 Wheels and tires diagnosis and repair -- The student will be able to:

- 55.01 Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action.
- 55.02 Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action.

56.0 Frame service and repair -- The student will be able to:

- 56.01 Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action.
- 56.02 Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.
- 56.03 Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs.
- 56.04 Inspect, install, or repair frame hangers, brackets, and cross members in accordance with manufacturers' recommended procedures.
- 56.05 Inspect, repair or replace pintle hooks and draw bars.

**Course Number: DIM0108**

**Occupational Completion Point: H**

**Diesel Drivetrain Technician – 150 Hours – SOC Code 49-3031**

57.0 Clutch diagnosis and repair -- The student will be able to:

- 57.01 Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.
- 57.02 Inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull-type assemblies); check pedal height and travel; perform needed action.
- 57.03 Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.
- 57.04 Inspect, adjust, lubricate or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.
- 57.05 Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc.
- 57.06 Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.
- 57.07 Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action.
- 57.08 Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms. Inspect and replace pilot bearing.
- 57.09 Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action.
- 57.10 Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action.
- 57.11 Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action.

58.0 Transmission diagnosis and repair -- The student will be able to:

- 58.01 Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action.

- 58.02 Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action.
- 58.03 Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers.
- 58.04 Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.
- 58.05 Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action.
- 58.06 Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed.
- 58.07 Check transmission fluid level and condition; determine needed service; add proper type of lubricant.
- 58.08 Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.
- 58.09 Remove and reinstall transmission.
- 58.10 Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed.
- 58.11 Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed.
- 58.12 Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed.
- 58.13 Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed.
- 58.14 Inspect and/or replace reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable).
- 58.15 Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed.
- 58.16 Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed.
- 58.17 Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed.
- 58.18 Inspect transmission oil filters and coolers; replace as needed.
- 58.19 Inspect mechanical and electronic speedometer components; determine needed action.
- 58.20 Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; perform needed action.
- 58.21 Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed.
- 58.22 Inspect and test transmission temperature gauge sending unit/sensor; determine needed action.
- 58.23 Inspect, test operation, adjust, repair, or replace automated mechanical transmission and manual electronic shift controls, shift, range and splitter solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses.
- 58.24 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines.
- 58.25 Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear

- codes, and interpret digital multimeter (DMM) readings; determine needed repairs.
- 58.26 Inspect, test operation, adjust, repair, or replace automatic transmission electronic and manual shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCE) neutral/in gear and reverse switches and wiring harnesses.
  - 58.27 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, switches, displays and indicators, wiring harnesses.
  - 58.28 Use appropriate diagnostic tools and procedures to diagnose automated transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs.
- 59.0 Driveshaft and universal joint diagnosis and repair -- The student will be able to:
- 59.01 Diagnose driveshaft and universal joint noise and vibration problems; determine needed action.
  - 59.02 Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes.
  - 59.03 Inspect and replace driveshaft center support bearings and mounts; determine needed action.
  - 59.04 Measure and adjust drive line angles.
- 60.0 Drive axle diagnosis and repair -- The student will be able to:
- 60.01 Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action.
  - 60.02 Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals.
  - 60.03 Check drive axle fluid level and condition; determine needed service; add proper type of lubricant.
  - 60.04 Remove and replace differential carrier assembly.
  - 60.05 Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings.
  - 60.06 Inspect and replace components of locking differential case assembly.
  - 60.07 Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action.
  - 60.08 Measure ring gear runout; determine needed action.
  - 60.09 Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings.
  - 60.10 Measure and adjust drive pinion bearing preload.
  - 60.11 Measure and adjust drive pinion depth.
  - 60.12 Measure and adjust side bearing preload and ring gear backlash.
  - 60.13 Check and interpret ring gear and pinion tooth contact pattern; determine needed action.
  - 60.14 Inspect, adjust, or replace ring gear thrust block/bolt.
  - 60.15 Inspect, adjust, repair, or replace planetary gear-type 2-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover, and springs.
  - 60.16 Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors.
  - 60.17 Inspect power divider (inter-axle differential) assembly; determine needed action.

- 60.18 Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.
- 60.19 Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters.
- 60.20 Inspect and replace drive axle shafts.
- 60.21 Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action.
- 60.22 Diagnose drive axle for wheel bearing noise and damage; perform needed action.
- 60.23 Inspect and test drive axle temperature gauge sending unit/sensor; determine needed action.
- 60.24 Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings.

**Course Number: DIM0110**

**Occupational Completion Point: I**

**Diesel Power Train Technician – 150 Hours – SOC Code 49-3031**

- 61.0 Demonstrate shop and occupational safety procedures--The student will be able to:
  - 61.01 For all track system and power train technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 61.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment; and the handling, storage, and disposal of chemicals and hazardous materials.
- 62.0 Identify the requirements for maintenance and repairing track systems--The student will be able to:
  - 62.01 Identify types of track system components.
  - 62.02 Describe common problems with track systems and components.
  - 62.03 Explain methods for removing, installing, and aligning track assemblies.
  - 62.04 Demonstrate methods for maintaining and repairing track systems.
  - 62.05 Demonstrate methods for maintaining track assemblies, sprockets, bottom rollers, top rollers, and idler.
- 63.0 Maintain and repair power train systems and components--The student will be able to:
  - 63.01 Troubleshoot and repair components and assemblies of winches, clutches, and transmissions.
  - 63.02 Describe common problems of operation of winches, clutches, and transmissions.
  - 63.03 Remove, replace or rebuild, and adjust transmissions.
  - 63.04 Remove, replace, and adjust push- and pull-type clutches.
  - 63.05 Inspect flywheel surface for wear or cracks.
  - 63.06 Replace pilot and clutch release bearing.
  - 63.07 Rebuild and adjust manual transmission and linkage.
- 64.0 Maintain and repair differentials, final drives, and drivetrains--The student will be able to:

- 64.01 Describe procedures to troubleshoot and repair final drive assemblies.
- 64.02 Inspect drive shaft for correct timing.
- 64.03 Replace universal joints.
- 64.04 Rebuild differential assembly.
- 64.05 Overhaul differential.

65.0 Demonstrate the qualifications for employment--The student will be able to:

- 65.01 Demonstrate shop organization, management, and safety requirements for a diesel power train technician.
- 65.02 Demonstrate the use of tools and equipment required for an electrical and electronics technician.
- 65.03 Demonstrate workplace communication skills required by a diesel power train technician.
- 65.04 Demonstrate the application of math and science principles required for a diesel power train technician's job tasks.
- 65.05 Demonstrate employability skills as a diesel power train technician.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Advanced Automotive Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I470604
CIP Number	0647.060406
Grade Level	30, 31
Standard Length	2400 Hours
Teacher Certification	AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 10.0 Reading: 10.0

### **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 planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### **Program Structure**



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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0011	Automotive Maintenance Technician	400	49-3023
B	AER0118	Advanced Engine Repair Technician	200	49-3023
C	AER0258	Advanced Automatic Transmission and Transaxle Technician	200	49-3023
D	AER0275	Advanced Manual Drivetrain and Axle Technician	200	49-3023
E	AER0459	Advanced Automotive Suspension and Steering Technician	200	49-3023
F	AER0419	Advanced Automotive Brake System Technician	200	49-3023
G	AER0319	Advanced Automotive Electrical/Electronic System Technician	400	49-3023
H	AER0173	Advanced Automotive Heating and Air Conditioning Technician	200	49-3023
I	AER0506	Advanced Automotive Engine Performance Technician	400	49-3023

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for employment and/or specialized training in the automotive industry. The program provides specialized corporate/association job preparatory training.

This program requires a written business plan that establishes a partnership agreement between the educational institution and the automotive industry.

Competencies established by the Automotive Industry plus those included in the business plan and integration of academic requirements and training in communications, leadership, human

relations, employability skills and safe, efficient work practices constitute the program curriculum.

All the NATEF tasks are assigned a priority number: P-1, P-2, or P-3. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the NATEF Policies section for additional information on the requirements for instruction on tasks.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for employment in the automotive service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

Occupational Completion Points may be reached before the end of a program. All outcomes must be completed to receive credit for an Occupational Completion Point (OCP).

1. It is assumed that:

- \* In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
- \* The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
- \* The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.

2. It is assumed that:

- \* All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published.

3. It is assumed that:

- \* Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
- \* Learning progress of students will be monitored and evaluated against these performance standards;
- \* A system is in place which informs all students of their individual progress through all phases of the training program.

4. It is assumed that:

- \* Individual courses of study will differ across automobile technician training programs;
- \* Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.

5. It is assumed that:

- \* All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law";
- \* Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

The program must be NATEF Master Certified and have a business plan approved by the appropriate industry affiliated organization. Instructors must be ASE Certified in all areas that they teach in addition to being certified in Engine Performance and Electrical/Electronic Systems. ASE Master Technician and Advanced Engine Performance (L1) ASE Certification is preferred. Instructors must meet the specific product certification as specified in the business plan.

Program must meet the equipment and specialty tool requirement as specified in the business plan. Must offer Federally recognized refrigerant-recycling certification training.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 10.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry.
- 02.0 Demonstrate mathematics knowledge and skills.
- 03.0 Demonstrate science knowledge and skills
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry.
- 06.0 Demonstrate proficiency in routine maintenance and consumer services.
- 07.0 Demonstrate proficiency in engine theory and repairs.
- 08.0 Demonstrate language arts knowledge and skills
- 09.0 Solve problems using critical thinking skills, creativity and innovation.
- 10.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 11.0 Demonstrate proficiency in the operation and servicing of automatic transmission/trans-axle.
- 12.0 Use information technology tools
- 13.0 Describe the importance of professional ethics and legal responsibilities.
- 14.0 Demonstrate personal money-management concepts, procedures, and strategies
- 15.0 Demonstrate proficiency in the operation and servicing of manual drive trains and axles.
- 16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 18.0 Explain the importance of employability and entrepreneurship skills
- 19.0 Demonstrate proficiency in the operation of steering and suspension systems.
- 20.0 Demonstrate proficiency in the operation and servicing of automotive brake systems.
- 21.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train.
- 22.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems.
- 23.0 Demonstrate proficiency in engine performance service.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:           Advanced Automotive Technology**  
**PSAV Number:           I470604**

**Course Number: AER0011**  
**Occupational Completion Point: A**  
**Automotive Maintenance Technician – 400 Hours – SOC Code 49-3023**

01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry--The student will be able to:

- 01.01 Apply shop safety rules, EPA and OSHA standards.
- 01.02 Identify and use appropriate emergency first aid procedures.
- 01.03 Identify, use and maintain hand and power tools properly.
- 01.04 Identify and practice using appropriate precision measuring tools and torque methods.
- 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, to include thread repair.
- 01.06 Identify and use metric and English measurement skills.
- 01.07 Use computer and operate keyboard.
- 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
- 01.09 Identify and describe typical automotive lubricants and lubricant properties.
- 01.10 Interpret the Florida 'Workers Right To Know Law'.
- 01.11 Identify and describe typical automotive seals and gaskets.
- 01.12 Identify and use the proper procedures required for cutting tubing and double and ISO flaring.
- 01.13 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
- 01.14 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
- 01.15 Describe and identify supplemental restraint systems (SRS).
- 01.16 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

02.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

- 02.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 02.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 02.03 Construct charts/tables/graphs using functions and data. AF3.5

03.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0

- 03.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 03.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 04.02 Locate, organize and reference written information from various sources. CM 3.0
  - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 04.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 04.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 05.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry--  
The student will be able to:
- 05.01 Explain the effects of chemical/substance abuse.
  - 05.02 Identify principles of stress management.
  - 05.03 Identify and define career opportunities in the automotive service industry.
  - 05.04 Demonstrate acceptable industry dress code.
  - 05.05 Identify and demonstrate proper customer relations skills.
  - 05.06 Identify and define payroll deductions (taxes, insurance, social security) employee benefits and pay systems.
  - 05.07 Identify principles of time management.
  - 05.08 Identify acceptable customer relations.
- 06.0 Demonstrate proficiency in routine maintenance and consumer services (AKA Light Line AKA General Service Technician)--The student will be able to:
- 06.01 Inspect, test head lamps, tail lamps and stop lamps. Aim headlights.
  - 06.02 Perform oil and filter change.
  - 06.03 Service transmission; perform visual inspection; replace fluids and filters.
  - 06.04 Inspect engine assembly for fuel, oil, coolant, and other leaks.
  - 06.05 Inspect manual and power steering fluid levels and condition.
  - 06.06 Check rear axle drive assembly seals and vents; check lube level.
  - 06.07 Inspect and replace power steering hoses and fittings.
  - 06.08 Lubricate suspension and steering systems.
  - 06.09 Inspect, remove, and replace shock absorbers.
  - 06.10 Remove, inspect, and service front and rear wheel bearings on non-drive axles.
  - 06.11 Inspect tires, diagnose tire wear patterns. Check and adjust air pressure.
  - 06.12 Rotate tires according to manufacturer's recommendations, install wheels, torque lug nuts.
  - 06.13 Balance wheel and tire assembly (static and dynamic).
  - 06.14 Dismount, inspect, repair, and remount tire on wheel.
  - 06.15 Check master cylinder for internal and external leaks and proper operation.
  - 06.16 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
  - 06.17 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
  - 06.18 Select, handle, store, and install brake fluids to proper level.

- 06.19 Fill master cylinder with recommended fluid and seat pads.
- 06.20 Inspect, clean, fill, and replace battery.
- 06.21 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
- 06.22 Start a vehicle using jumper cables using a battery auxiliary power supply.
- 06.23 Perform slow/fast battery charge.
- 06.24 Observe dash warning lamps during bulb check.
- 06.25 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).
- 06.26 Practice recommended precautions when handling static sensitive devices.
- 06.27 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.
- 06.28 Perform product specific service procedures.
- 06.29 Reset product specific service indicator.
- 06.30 Demonstrate knowledge of manufacturer policies and procedures.
- 06.31 Identify product specific engine systems.
- 06.32 Identify product specific automatic transmission systems.
- 06.33 Identify product specific manual transmission systems.
- 06.34 Identify product specific electrical & electronic systems.
- 06.35 Identify product specific Heating & A/C systems.
- 06.36 Identify product specific steering & suspension systems.
- 06.37 Identify product specific brake systems.
- 06.38 Identify product specific audio systems.
- 06.39 Identify product specific safety systems.
- 06.40 Identify product specific accessories.
- 06.41 Use wiring diagrams of electrical circuit problems.
- 06.42 Check electrical circuits with a test light; determine necessary action.
- 06.43 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).
- 06.44 Check current flow in electrical/electronic circuits and components using an ammeter.
- 06.45 Check electrical circuits using jumper wires.
- 06.46 Measure and diagnose the cause(s) of abnormal key-off battery drain.
- 06.47 Inspect and test fusible links, circuit breakers, and fuses; replace as needed.
- 06.48 Perform battery capacity (load, high-rate discharge) test; determine needed service.
- 06.49 Maintain or restore electronic memory functions.
- 06.50 Perform starter current draw and circuit voltage drop test; determine necessary action.
- 06.51 Remove and replace/reinstall starter.
- 06.52 Perform charging system test.
- 06.53 Remove, inspect, and replace/reinstall alternator.
- 06.54 Demonstrate retrieving stored diagnostic trouble codes.
- 06.55 Obtain and interpret digital multimeter (DMM) readings.
- 06.56 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
- 06.57 Replace fuel filters.
- 06.58 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.
- 06.59 Adjust valves on engines with mechanical lifters.
- 06.60 Remove and replace valve cover gaskets (ASE).
- 06.61 Return cores for rebuilt and exchange items.



- 06.62 Inspect passenger restraint system, repair if needed.
- 06.63 Maintain product specific engine systems.
- 06.64 Maintain product specific automatic transmission systems.
- 06.65 Maintain product specific manual transmission systems.
- 06.66 Maintain product specific electrical & electronic systems.
- 06.67 Maintain product specific Heating & A/C systems.
- 06.68 Maintain product specific steering & suspension systems.
- 06.69 Maintain product specific brake systems.
- 06.70 Maintain product specific audio systems.
- 06.71 Maintain product specific safety systems.
- 06.72 Maintain product specific accessories.

**Course Number: AER0018**

**Occupational Completion Point: B**

**Advanced Engine Repair Technician – 200 Hours – SOC Code 49-3023**

07.0 Demonstrate proficiency in engine theory and repair--The student will be able to:

- 07.01 Service product specific engine systems.
- 07.02 Interpret and verify complaint; determine necessary action.
- 07.03 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 07.04 Listen to engine noises; determine necessary action.
- 07.05 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.
- 07.06 Perform engine vacuum tests; determine necessary action.
- 07.07 Perform cylinder power balance tests; determine necessary action.
- 07.08 Perform cylinder compression tests; determine necessary action.
- 07.09 Perform cylinder leakage tests; determine necessary action.
- 07.10 Remove engine (front-wheel drive); prepare for disassembly.
- 07.11 Reinstall engine (front-wheel drive).
- 07.12 Remove engine (rear-wheel drive); prepare for disassembly.
- 07.13 Reinstall engine (rear-wheel drive).

**Cylinder Head and Valve Train Diagnosis and Repair**

- 07.14 Remove cylinder head(s); inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.
- 07.15 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.
- 07.16 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed.
- 07.17 Inspect valve spring retainers, locks, and valve grooves.
- 07.18 Replace valve stem seals.
- 07.19 Inspect valve guides for wear; check valve guide height and stem-to-guide clearance; recondition or replace as needed.
- 07.20 Inspect valves; resurface or replace.
- 07.21 Inspect valve seats; resurface or replace.
- 07.22 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed.

- 07.23 Check valve spring assembled height and valve stem height; service valve and spring assemblies as needed.
- 07.24 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); repair or replace.
- 07.25 Inspect hydraulic or mechanical lifters; replace as needed.
- 07.26 Adjust valves (mechanical or hydraulic lifters).
- 07.27 Inspect and replace camshaft drives (including gear wear and backlash, sprocket and chain wear, overhead cam drive sprockets, drive belts, belt tension, and tensioners).
- 07.28 Inspect camshaft for run out; measure journals and lobes for wear.
- 07.29 Inspect and measure camshaft bearings for wear, damage, out-of round, and alignment; determine necessary action.
- 07.30 Verify camshaft(s) timing according to manufacturer's specifications and procedure. P-2
- 07.31 Service product specific cam drive systems.
- 07.32 Perform product specific valve adjustments.

### **Engine Block Diagnosis and Repair**

- 07.33 Inspect and replace pans, covers, gaskets, and seals.
- 07.34 Inspect engine block for cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed repairs.
- 07.35 Inspect internal and external threads; repair as needed.
- 07.36 Remove cylinder wall ridges.
- 07.37 Inspect and measure cylinder walls for damage and wear; determine necessary action.
- 07.38 Deglaze and clean cylinder walls.
- 07.39 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
- 07.40 Inspect crankshaft for surface cracks and journal damage; check oil passage condition; measure journal wear; determine necessary action.
- 07.41 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings).
- 07.42 Identify position and bearing wear patterns that include connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition.
- 07.43 Inspect, measure, service or replace pistons.
- 07.44 Inspect, measure, and install piston rings.
- 07.45 Inspect, repair or replace crankshaft vibration damper (harmonic balancer).
- 07.46 Inspect flywheel or flexplate and ring gear for cracks and wear; measure run out; determine necessary action.
- 07.47 Inspect, remove, and replace crankshaft pilot bearing or bushing (as applicable).
- 07.48 Reassemble engine components using correct gaskets and sealants.
- 07.49 Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.

### **Lubrication and Cooling Systems Diagnosis and Repairs**

- 07.50 Prime engine lubrication system.

- 07.51 Perform oil pressure tests; determine necessary action.
  - 07.52 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; replace as needed.
  - 07.53 Perform cooling system tests (pressure, combustion leakage, and temperature); determine necessary action.
  - 07.54 Inspect, replace, and adjust drive belts and pulleys.
  - 07.55 Inspect and replace engine cooling and heater system hoses.
  - 07.56 Inspect, test, and replace thermostat and housing.
  - 07.57 Inspect coolant; drain, flush, and refill cooling system with recommended coolant and bleed air as required.
  - 07.58 Inspect, test, remove, and replace water pump.
  - 07.59 Inspect and test radiator, pressure cap, and coolant recovery system; remove and replace radiator.
  - 07.60 Clean, inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
  - 07.61 Inspect and test electrical fan control system and circuits.
  - 07.62 Inspect auxiliary oil coolers; replace as needed.
  - 07.63 Inspect, test, and replace oil temperature and pressure switches and sensors.
  - 07.64 Perform oil and filter change.
  - 07.65 Service product specific water pumps.
  - 07.66 Service product specific belt drive & tensioner systems.
- 08.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 08.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 08.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 08.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 09.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 09.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 09.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 09.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 09.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 10.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 10.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 10.02 Explain emergency procedures to follow in response to workplace accidents.
  - 10.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: AER0258**  
**Occupational Completion Point: C**  
**Advanced Automatic Transmission and Transaxle Technician – 200 Hours – SOC Code 49-3023**

11.0 Demonstrate proficiency in the operation and servicing of automatic transmission/transaxle--The student will be able to:

- 11.01 Interpret and verify driver's complaint; verify proper engine operation; determine necessary action.
- 11.02 Diagnose unusual fluid usage, level, and condition problems; determine necessary action.
- 11.03 Perform pressure tests; determine necessary action.
- 11.04 Perform stall tests; determine necessary action.
- 11.05 Perform lock-up converter system tests; determine necessary action.
- 11.06 Diagnose electronic, mechanical, and vacuum control systems; determine necessary action.
- 11.07 Diagnose noise and vibration problems; determine necessary action.

**Transmission and Transaxle Maintenance and Adjustment**

- 11.08 Inspect, adjust or replace manual shift valve and throttle (TV) linkages or cables and check gear select indicator (as applicable).
- 11.09 Service transmission; perform visual inspection; replace fluids and filters.

**In-Vehicle Transmission and Transaxle Repair**

- 11.10 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.
- 11.11 Inspect, repair, and replace governor assembly.
- 11.12 Inspect and replace external seals and gaskets.
- 11.13 Inspect extension housing; replace bushing and seals.
- 11.14 Inspect, leak test, flush, and replace cooler, lines, and fittings.
- 11.15 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 11.16 Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets); check/adjust valve body bolt torque.
- 11.17 Inspect servo bore, piston, seals, pin, spring, and retainers; repair or replace as needed.
- 11.18 Inspect accumulator bore, piston, seals, spring, and retainer; repair or replace as needed.
- 11.19 Inspect, test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses).
- 11.20 Inspect, replace, and align power train mounts.
- 11.21 Inspect and replace parking pawl, shaft, spring, and retainer.

**Off-Vehicle Transmission and Transaxle Repair (Removal, Disassembly, and Reinstallation)**

- 11.22 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 11.23 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 11.24 Disassemble, clean, and inspect transmission/transaxle.
- 11.25 Assemble transmission/transaxle.

### **Oil Pump and Converter**

- 11.26 Inspect converter flex plate, attaching parts, pilot and pump drive, and seal areas.
- 11.27 Measure torque converter end play and check for interference check stator clutch.
- 11.28 Inspect, measure, and replace oil pump housings, shafts, vanes, rotors, gears, valves, seals, and bushings.
- 11.29 Check torque converter and transmission cooling system for contamination.

### **Gear Train, Shafts, Bushings and Case**

- 11.30 Check end play or preload; determine needed service.
- 11.31 Inspect, measure, and replace thrust washers and bearings.
- 11.32 Inspect oil delivery seal rings, ring grooves, and sealing surface areas.
- 11.33 Inspect bushings; replace as needed.
- 11.34 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); replace as needed.
- 11.35 Inspect cases, bores, passages, bushings, vents, and mating surfaces; replace as needed.
- 11.36 Inspect transaxle drive, link chains, sprockets, gears, bearings and bushings; replace as needed.
- 11.37 Inspect, measure, repair, adjust or replace transaxle final drive components.
- 11.38 Inspect and reinstall parking pawl, shaft, spring, and retainer; replace as needed.

### **Friction and Reaction Units**

- 11.39 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; replace as needed.
- 11.40 Measure clutch pack clearance; adjust as needed.
- 11.41 Air test operation of clutch and servo assemblies.
- 11.42 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed.
- 11.43 Inspect bands and drums; replace as needed. P-3
- 11.44 Achieve product specific certification requirements for automatic transmission systems.
- 11.45 Achieve product specific certification requirements for automatic transaxle systems.
- 11.46 Achieve product specific certification requirements for computer shifted transmission systems.

## **12.0 Use information technology tools. -- The students will be able to:**

- 12.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0

- 12.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 12.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 12.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 13.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 13.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 13.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 13.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 13.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 14.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 14.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 14.02 Describe the effect of money management on personal and career goals. FL 3.0
- 14.03 Develop a personal budget and financial goals. FL3.1
- 14.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 14.05 Maintain financial records. FL3.3
- 14.06 Read and reconcile financial statements. FL3.4
- 14.07 Research, compare and contrast investment opportunities.

**Course Number: AER0275****Occupational Completion Point: D****Advanced Manual Drivetrain and Axle Technician – 200 Hours – SOC Code 49-3023**

- 15.0 Demonstrate proficiency in the operation and assembly of manual drive transmission/transaxle--The student will be able to:
- 15.01 Diagnose clutch noise, binding, slippage, pulsation, and chatter problems; determine necessary action.
- 15.02 Inspect, adjust or replace clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs.
- 15.03 Inspect, adjust, repair or replace hydraulic clutch slave master-cylinders, lines, and hoses.
- 15.04 Inspect, adjust or replace release (throw-out) bearing, lever, and pivot.
- 15.05 Inspect and replace clutch pressure plate assembly and clutch disc.
- 15.06 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable).
- 15.07 Inspect, repair, and service or replace flywheel and ring gear.
- 15.08 Inspect engine block, clutch (bell) housing, and transmission case mating surface; determine necessary action.
- 15.09 Measure flywheel-to-block run out and crankshaft end play; determine necessary action.

- 15.10 Measure clutch (bell) housing bore-to-crankshaft run out and face squareness; determine needed service.

### **Transmission Diagnosis and Repair**

- 15.11 Diagnose transmission noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action.
- 15.12 Inspect, adjust, and replace transmission shift linkages, brackets, bearings, cables, pivots, and levers.
- 15.13 Inspect, replace, and align power train mounts.
- 15.14 Inspect and replace transmission gaskets, seals, and sealants; Inspect sealing surfaces.
- 15.15 Remove and reinstall transmission.
- 15.16 Disassemble, clean, and reassemble transmission components.
- 15.17 Inspect, adjust, and reinstall transmission shift cover, forks, grommets, levers, shafts, sleeves, detent mechanisms, interlocks, and springs.
- 15.18 Inspect and reinstall input (clutch) shaft and bearings.
- 15.19 Inspect and reinstall main shaft, gears, thrust washers, bearings, and retainers.
- 15.20 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
- 15.21 Inspect and reinstall counter (cluster) gear, shaft, bearings, thrust washers, and retainers; check end play; adjust as needed.
- 15.22 Inspect and reinstall reverse idler gear, shaft, bearings, thrust washers, and retainers; check end play; adjust as needed.
- 15.23 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 15.24 Inspect, repair, and replace extension housing and transmission case mating surfaces, bores, bushings, and vents.
- 15.25 Inspect lubrication devices (oil pump or slingers).
- 15.26 Achieve product specific certification for manual transmission systems.

### **Transaxle Diagnosis and Repair**

- 15.27 Diagnose transaxle noise, hard shifting, jumping out of gear, and fluid leakage problem; determine necessary action.
- 15.28 Inspect, adjust, and reinstall transaxle shift linkages, brackets, bushings, cables, pivots, and levers.
- 15.29 Inspect and reinstall power train mounts.
- 15.30 Remove and reinstall transaxle.
- 15.31 Inspect and replace transaxle gaskets, seals, and sealants; inspect sealing surfaces.
- 15.32 Remove and replace transaxle final drive.
- 15.33 Disassemble and clean transaxle final drive.
- 15.34 Inspect, adjust, and reinstall transaxle shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.
- 15.35 Inspect and reinstall input (clutch) shaft and bearings.
- 15.36 Inspect and reinstall output shaft, gears, thrust washers, bearings, and retainers.
- 15.37 Measure end play or preload (shim or spacer selection procedure) on transaxle shafts; adjust as needed.
- 15.38 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.

- 15.39 Inspect and reinstall reverse idler gear, shaft, bearings, thrust washers, and retainers.
- 15.40 Inspect transaxle case, mating surfaces, bores, bushings, and vents.
- 15.41 Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 15.42 Diagnose differential assembly noise and vibration problems; determine necessary action.
- 15.43 Remove, inspect, measure, adjust, and reinstall differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.
- 15.44 Inspect lubrication devices (oil pump or slingers).
- 15.45 Achieve product specific certification for manual transaxle systems.

### **Drive and Half Shaft Universal and Constant-Velocity (CV) Joint Diagnosis and Repair**

- 15.46 Diagnose constant-velocity (CV) joint noise and vibration problems; determine necessary action.
- 15.47 Diagnose universal joint noise and vibration problems; determine necessary action.
- 15.48 Diagnose front wheel drive (FWD) front wheel bearing noise and vibration problems; determine necessary action.
- 15.49 Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
- 15.50 Inspect, service, and replace shaft center support bearings.
- 15.51 Check and correct shaft balance; measure shaft run out; measure and adjust driveline angles.

### **Rear Axle Diagnosis and Repair; Ring and Pinion Gears and Differential Case Assembly**

- 15.52 Diagnose noise and vibration problems; determine necessary action.
- 15.53 Diagnose fluid leakage problems; determine necessary action.
- 15.54 Inspect and replace companion flange and pinion seal; measure companion flange run out.
- 15.55 Inspect ring gear and measure run out; determine necessary action.
- 15.56 Remove and inspect drive pinion gear, spacers, sleeves, and bearings.
- 15.57 Measure and adjust drive pinion depth.
- 15.58 Measure and adjust drive pinion bearing preload.
- 15.59 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup and shim types).
- 15.60 Check ring and pinion tooth contact patterns; adjust as needed.
- 15.61 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
- 15.62 Reassemble and reinstall differential case assembly; measure run out; determine necessary action.
- 15.63 Achieve product specific certification for differentials.

### **Limited Slip Differential**

- 15.64 Diagnose noise, slippage, and chatter problems; determine necessary action.
- 15.65 Inspect and flush differential housing; refill with correct lubricant.



- 15.66 Inspect and reinstall clutch (cone or plate) components.
- 15.67 Measure rotating torque; determine necessary action

### **Axle Shaft**

- 15.68 Diagnose rear axle shafts, bearings, and seals for noise, vibration, and fluid leakage problems; determine necessary action.
- 15.69 Inspect and replace rear axle shaft wheel studs.
- 15.70 Remove and replace rear axle shafts.
- 15.71 Inspect and replace rear axle shaft seals, bearings, and retainers.
- 15.72 Measure rear axle flange run out and shaft end play; determine necessary action.

### **Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair**

- 15.73 Diagnose noise, vibration, and unusual steering problems; determine necessary action.
- 15.74 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
- 15.75 Remove and reinstall transfer case.
- 15.76 Disassemble, service, and reassemble transfer case and components.
- 15.77 Inspect, service, and replace front-wheel bearings and locking hubs.
- 15.78 Check drive assembly seals and vents; check lube level.
- 15.79 Inspect viscous coupling assembly.
- 15.80 Achieve product specific certification for all wheel drive systems.

### 16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 16.01 Describe the nature and types of business organizations. SY 1.0
- 16.02 Explain the effect of key organizational systems on performance and quality.
- 16.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 16.04 Explain the impact of the global economy on business organizations.

### 17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 17.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 17.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 17.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 17.04 Employ mentoring skills to inspire and teach others. LT 5.0

### 18.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 18.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 18.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 18.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 18.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 18.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0

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|-------|--|----------|
| 18.06 | Identify and exhibit traits for retaining employment.                            | ECD 7.0  |
| 18.07 | Identify opportunities and research requirements for career advancement.         | ECD 8.0  |
| 18.08 | Research the benefits of ongoing professional development.                       | ECD 9.0  |
| 18.09 | Examine and describe entrepreneurship opportunities as a career planning option. | ECD 10.0 |

**Course Number: AER0459****Occupational Completion Point: E****Advanced Automotive Suspension and Steering Technician – 200 Hours – SOC Code 49-3023**

- 19.0 Demonstrate proficiency in the operation of steering and suspension systems--The student will be able to:
- 19.01 Disable supplemental restraint system (SRS) in accordance with manufacturer's procedures.
  - 19.02 Diagnose steering column noises, looseness, and binding problems (including tilt mechanisms); determine necessary action.
  - 19.03 Diagnose power non-rack and pinion steering gear binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine necessary action.
  - 19.04 Diagnose power rack and pinion steering gear vibration, looseness, and hard steering problems; determine necessary action.
  - 19.05 Inspect and replace steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel.
  - 19.06 Adjust manual or power non-rack and pinion worm bearing preload and sector lash.
  - 19.07 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.
  - 19.08 Disassemble, inspect, repair, and reassemble rack and pinion steering gear.
  - 19.09 Adjust manual or power rack and pinion steering gear.
  - 19.10 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
  - 19.11 Inspect manual and power steering fluid levels and condition.
  - 19.12 Flush, fill, and bleed power steering system.
  - 19.13 Diagnose power steering fluid leakage; determine necessary action.
  - 19.14 Inspect, replace, and adjust power steering pump belt.
  - 19.15 Remove, inspect, and replace power steering pump, pump mounts, pump seals, and gaskets.
  - 19.16 Remove, inspect, and replace power steering pump pulley; check alignment.
  - 19.17 Perform power steering system pressure test; determine needed repairs.
  - 19.18 Inspect and replace power steering hoses and fittings.
  - 19.19 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
  - 19.20 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
  - 19.21 Diagnose, inspect, adjust, repair or replace components of electronically-controlled steering systems.
  - 19.22 Diagnose, inspect, repair or replace components of variable-assist steering systems.
  - 19.23 Achieve product specific certification for power assisted steering systems.
  - 19.24 Achieve product specific certification for variable assisted steering systems.

## **Suspension Systems Diagnosis and Repair; Front Suspensions**

- 19.25 Diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine necessary action.
- 19.26 Diagnose MacPherson strut suspension system noises body sway, and uneven riding height problems; determine necessary action.
- 19.27 Remove, inspect, and replace upper and lower control arms, bushings, shafts, and rebound bumpers.
- 19.28 Remove, inspect, replace, and adjust strut (compression/tension) rods and bushings.
- 19.29 Remove, inspect, and replace upper and lower ball joints on short and long arm suspension systems.
- 19.30 Remove, inspect, and replace steering knuckle assemblies.
- 19.31 Remove, inspect, and replace short and long arm suspension system coil springs and spring insulators.
- 19.32 Remove, inspect, replace, and adjust suspension system torsion bars; inspect mounts.
- 19.33 Remove, inspect and replace stabilizer bar bushings, brackets, and links.
- 19.34 Remove, inspect and replace ball joints on MacPherson strut suspension systems.
- 19.35 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, insulators, and upper strut bearing mount.
- 19.36 Lubricate suspension and steering systems.
- 19.37 Service product specific suspension systems.

## **Rear Suspensions**

- 19.38 Remove, inspect, and replace coil springs and spring insulators.
- 19.39 Remove, inspect, and replace transverse links, control arms, bushings, and mounts.
- 19.40 Remove, inspect, and replace leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
- 19.41 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers).
- 19.42 Service product specific suspension systems.

## **Miscellaneous Service**

- 19.43 Inspect, remove, and replace shock absorbers.
- 19.44 Remove, inspect, and service or replace front and rear wheel bearings.
- 19.45 Diagnose, inspect, adjust, repair or replace components of electronically-controlled suspension systems.
- 19.46 Service product specific ride height control systems.

## **Wheel Alignment Diagnosis, Adjustment, and Repair**

- 19.47 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return problems; determine necessary action.
- 19.48 Measure vehicle riding height; determine necessary action.
- 19.49 Check and adjust front and rear wheel camber; determine needed repairs.

- 19.50 Check and adjust caster; determine necessary action.
- 19.51 Check and adjust front wheel toe; adjust as needed.
- 19.52 Center steering wheel.
- 19.53 Check toe-out-on-turns (turning radius); determine needed repairs.
- 19.54 Check SAI (steering axis inclination) and included angle; determine necessary action.
- 19.55 Check and adjust rear wheel toe.
- 19.56 Check rear wheel thrust angle; determine necessary action.
- 19.57 Check for front wheel setback; determine necessary action.
- 19.58 Check front cradle (subframe) alignment; determine needed repairs.

### **Wheel and Tire Diagnosis and Repair**

- 19.59 Diagnose tire wear patterns; determine necessary action.
- 19.60 Inspect tires; check and adjust air pressure.
- 19.61 Diagnose wheel/tire vibration, shimmy, and noise problems; determine necessary action.
- 19.62 Rotate tires according to manufacturer's recommendations.
- 19.63 Measure wheel, tire, axle, and hub run out; determine needed repairs.
- 19.64 Diagnose tire pull (lead) problem; determine corrective actions.
- 19.65 Balance wheel and tire assembly (static and dynamic).
- 19.66 Dismount, inspect, repair, and remount tire on wheel.
- 19.67 Reinstall wheel; torque lug nuts.

**Course Number: AER0419**

**Occupational Completion Point: F**

**Advanced Automotive Brake System Technician – 200 Hours – SOC Code 49-3023**

20.0 Demonstrate proficiency in the operation and servicing of automotive brake system--The student will be able to:

- 20.01 Measure and adjust pedal pushrod length and pedal height.
- 20.02 Check master cylinder for internal and external leaks and proper operation; determine necessary action.
- 20.03 Remove, bench bleed, and replace master cylinder.
- 20.04 Diagnose poor stopping, pulling or dragging caused by problems in the hydraulic system; determine necessary action.
- 20.05 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
- 20.06 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
- 20.07 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.
- 20.08 Select, handle, store, and install brake fluids to proper level.
- 20.09 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.
- 20.10 Inspect, test, replace, and adjust height (load) sensing proportioning valve.
- 20.11 Inspect, test, and replace components of brake warning light system.
- 20.12 Bleed (manual, pressure, vacuum or surge) brake system; flush hydraulic system.P-1

### **Drum Brake Diagnosis and Repair**

- 20.13 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation problems; determine necessary action.
- 20.14 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or replace as needed.
- 20.15 Mount brake drum on lathe machine braking surface.
- 20.16 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- 20.17 Remove and reinstall wheel cylinders.
- 20.18 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
- 20.19 Reinstall wheel, torque lug nuts, and make final checks and adjustments.

### **Disc Brake Diagnosis and Repair**

- 20.20 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation caused problems; determine necessary action.
- 20.21 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing.
- 20.22 Clean and inspect caliper mounting and slides for wear and damage.
- 20.23 Remove, clean, and inspect pads and retaining hardware; determine needed service.
- 20.24 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.
- 20.25 Reassemble, lubricate, and reinstall caliper, pads, and related hardware.
- 20.26 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.
- 20.27 Refinish rotor according to manufacturer's recommendations.
- 20.28 Adjust calipers with integrated parking brake system.
- 20.29 Fill master cylinder with recommended fluid and seat pads; inspect caliper for leaks.
- 20.30 Reinstall wheel, torque lug nuts, and make final checks and adjustments.
- 20.31 Remove and replace rotor.

### **Power Assist Units Diagnosis and Repair**

- 20.32 Test pedal free travel with and without engine running; check power assist operation.
- 20.33 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
- 20.34 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; repair or replace parts as needed.

### **Miscellaneous Diagnosis and Repair (Wheel Bearings, Parking Brakes, Electrical, Etc.)**

- 20.35 Diagnose wheel bearing noises, wheel shimmy, and vibration problems; determine necessary action.

- 20.36 Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings.
- 20.37 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed.
- 20.38 Check parking brake operation; adjust as needed.
- 20.39 Check operation of parking brake indicator light system.
- 20.40 Check operation of brake stop light system; adjust and service as needed.
- 20.41 Replace wheel bearing and race.

### **Anti-Lock Brake System**

- 20.42 Inspect, test, and service anti-lock brake system (ABS) hydraulic, electrical, and mechanical components.
- 20.43 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise problems caused by the anti-lock brake system (ABS); determine necessary action.
- 20.44 Observe anti-lock brake system (ABS) warning light(s) at startup; determine if further diagnosis is needed.
- 20.45 Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.
- 20.46 Depressurize high pressure components of the anti-lock brake system (ABS) following manufacturer's recommended safety procedures.
- 20.47 Fill the anti-lock brake system (ABS) master cylinder with recommended fluid following manufacturer's procedures; inspect system for leaks.
- 20.48 Bleed the anti-lock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures.
- 20.49 Perform a fluid pressure (hydraulic boost) diagnosis on the high pressure anti-lock brake system (ABS); determine necessary action.
- 20.50 Remove and install anti-lock brake system (ABS) electrical/electronic/hydraulic components following manufacturer's procedures and specifications.
- 20.51 Service, test, and adjust anti-lock brake system (ABS) speed sensors following manufacturer's recommended procedures.
- 20.52 Diagnose anti-lock brake system (ABS) braking problems caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).
- 20.53 Achieve product specific certification requirements for anti-lock brake systems.
- 20.54 Service product specific anti-lock brake systems
- 20.55 Service product specific traction control systems.

### **Course Number: AER0319**

### **Occupational Completion Point: G**

### **Advanced Automotive Electrical/Electronic System Technician – 400 Hours – SOC Code 49-3023**

- 21.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic related components--The student will be able to:
  - 21.01 Use wiring diagrams during diagnosis of electrical circuit problems.
  - 21.02 Check electrical circuits with a test light; determine necessary action.
  - 21.03 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine needed repairs.

- 21.04 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
- 21.05 Check electrical circuits using jumper wires; determine necessary action.
- 21.06 Find shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
- 21.07 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action.
- 21.08 Inspect and test fusible links, circuit breakers, and fuses; replace as needed.P-1
- 21.09 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or replace as needed.

### **Battery Diagnosis and Service**

- 21.10 Perform battery state-of-charge test; determine needed service.
- 21.11 Perform battery capacity (load, high-rate discharge) test; determine needed service.
- 21.12 Maintain or restore electronic memory functions.
- 21.13 Inspect, clean, fill, and replace battery.
- 21.14 Perform slow/fast battery charge.
- 21.15 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
- 21.16 Start a vehicle using jumper cables and a battery or auxiliary power supply.

### **Starting System Diagnosis and Repair**

- 21.17 Perform starter current draw and circuit voltage drop test; determine necessary action
- 21.18 Inspect and test starter relays and solenoids; replace as needed.
- 21.19 Remove and replace/reinstall starter.
- 21.20 Perform starter bench tests; determine necessary action.
- 21.21 Inspect, test, and repair or replace switches, connectors, and wires of starter control circuits.
- 21.22 Disassemble, clean, inspect, and test starter components; replace as needed.

### **Charging System Diagnosis and Repair**

- 21.23 Diagnose charging system problems that cause an undercharge, a no-charge or an overcharge condition.
- 21.24 Inspect and adjust alternator drive belts; replace as needed.
- 21.25 Inspect and test voltage regulator; replace as needed.
- 21.26 Remove, inspect, and replace/reinstall alternator.
- 21.27 Disassemble, clean, inspect, and test alternator components; replace as needed.
- 21.28 Perform charging circuit voltage drop tests; determine needed repairs.

### **Lighting Systems Diagnosis and Repair**

- 21.29 Diagnose brighter than normal, intermittent, dim or no light operation.
- 21.30 Inspect, replace, and aim headlights and bulbs.
- 21.31 Inspect and diagnose incorrect turn signal or hazard light operation; repair or replace as needed.

### **Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair**

- 21.32 Diagnose intermediate, high, low or no gauge readings.
- 21.33 Test gauge circuit voltage regulators (limiters); replace as needed.
- 21.34 Inspect and test gauges and gauge sending units; replace as needed.
- 21.35 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or replace as needed.
- 21.36 Diagnose incorrect operation of warning devices and other driver information systems.
- 21.37 Diagnose intermediate, high, low or no readings on electronic instrument clusters.
- 21.38 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; repair or replace as needed.

### **Horn and Wiper/Washer Diagnosis and Repair**

- 21.39 Diagnose incorrect horn operation; repair as needed.
- 21.40 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; repair as needed.
- 21.41 Diagnose incorrect windshield washer operation; repair as needed.

### **Accessories Diagnosis and Repair**

- 21.42 Diagnose incorrect operation of motor-driven accessory circuits; repair as needed.
- 21.43 Diagnose incorrect heated glass operation; repair as needed.
- 21.44 Diagnose incorrect electric door and hatch/trunk lock operation; repair as needed.
- 21.45 Diagnose incorrect operation of cruise control systems; repair as needed.
- 21.46 Diagnose supplemental restraint system (SRS) problems; repair as needed. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment.)
- 21.47 Diagnose radio static and weak, intermittent, or no radio reception.
- 21.48 Achieve product specific certification requirements for electrical/electronic systems.
- 21.49 Service and repair product specific electrical/electronic systems.
- 21.50 Perform product specific diagnostic procedures.

**Course Number: AER0173**

**Occupational Completion Point: H**

**Advanced Automotive Heating and Air Conditioning Technician – 200 Hours – SOC Code 49-3023**

22.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems--The student will be able to:

- 22.01 Diagnose unusual operating noises in the A/C system; determine necessary action.
- 22.02 Conduct a performance test of the A/C system; determine needed repairs.
- 22.03 Leak test a/c system; determine necessary action.
- 22.04 Inspect the condition of discharged oil.
- 22.05 Select oil type; measure and add oil to the A/C system as needed.



### **Refrigeration System Component Diagnosis and Repair Compressor and Clutch**

- 22.06 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
- 22.07 Inspect A/C compressor drive belts; replace and adjust as needed.
- 22.08 Inspect, test, and replace A/C compressor clutch components or assembly.
- 22.09 Remove and replace A/C compressor and mountings.
- 22.10 Inspect and replace A/C compressor shaft seal assembly(ies).

### **Evaporator, Receiver/Drier, Condenser, Etc.**

- 22.11 Diagnose A/C system problems caused by too much moisture in the refrigerant; determine necessary action.
- 22.12 Install A/C system filter.
- 22.13 Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; replace as needed.
- 22.14 Inspect A/C condenser for air flow restrictions; service as required.
- 22.15 Inspect receiver/drier or accumulator/drier; replace as needed.
- 22.16 Inspect and test expansion valve or orifice (expansion) tube; replace as needed.
- 22.17 Inspect evaporator housing water drain; repair as needed.

### **Heating and Engine Cooling Systems Diagnosis and Repair**

- 22.18 Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
- 22.19 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.
- 22.20 Inspect engine cooling and heater system hoses and belts; replace as needed.
- 22.21 Inspect, test, and replace thermostat and housing.
- 22.22 Determine coolant condition; drain and recover.
- 22.23 Flush system and refill with recommended coolant; bleed system.
- 22.24 Clean, inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; replace as needed.
- 22.25 Inspect and test heater control valve(s); replace as needed.

### **Operating Systems and Related Controls Diagnosis and Repairs**

- 22.26 Diagnose failures in the electrical controls of heating and A/C systems; determine necessary action.
- 22.27 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; repair as needed.
- 22.28 Test A/C compressor load cut-off systems; determine needed repairs.

### **Vacuum/Mechanical**

- 22.29 Diagnose failure in the vacuum and mechanical controls of the heating and A/C system; determine necessary action.
- 22.30 Inspect and test A/C-heater control panel assembly; replace as needed.
- 22.31 Inspect and test A/C-heater control cables and linkages adjust or replace as needed.

- 22.32 Inspect and test A/C-heater vacuum control switches, hoses, diaphragms (motor), vacuum reservoir, check valve, and restrictors; replace as needed.
- 22.33 Inspect and test A/C-heater ducts, doors, hoses, and outlets; replace as needed.

### **Automatic and Semi-Automatic Temperature Controls**

- 22.34 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

### **Refrigerant Recovery, Recycling, and Handling**

- 22.35 Verify correct operation and maintenance of refrigerant handling equipment.
- 22.36 Identify and recover A/C system refrigerant.
- 22.37 Recycle refrigerant.
- 22.38 Label and store refrigerant.
- 22.39 Test recycled refrigerant for non-condensable gases.
- 22.40 Evaluate and charge A/C system.
- 22.41 Achieve product specific certification requirements for climate control systems.
- 22.42 Service product specific climate control systems.

## **Course Number: AER0506**

### **Occupational Completion Point: I**

### **Advanced Automotive Engine Performance Technician – 400 Hours – SOC Code 49-3023**

#### 23.0 Demonstrate proficiency in engine performance services--The student will be able to:

- 23.01 Interpret and verify complaint; determine necessary action.
- 23.02 Demonstrate proficiency in use of computer-based information systems.
- 23.03 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 23.04 Diagnose unusual engine noise or vibration problems; determine necessary action.
- 23.05 Diagnose unusual exhaust color, odor, and sound; determine needed action.
- 23.06 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- 23.07 Perform cylinder power balance test; determine needed action.
- 23.08 Perform cylinder compression test; determine needed action.
- 23.09 Perform cylinder leakage test; determine needed action.
- 23.10 Diagnose engine mechanical, electrical, electronic, fuel and ignition problems with an oscilloscope and engine diagnostic equipment; determine needed action.
- 23.11 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine needed action.

### **Computerized Engine Controls Diagnosis and Repair**

- 23.12 Diagnose emissions or driveability problems resulting from of computerized engine controls with no diagnostic trouble codes stored; determine necessary action.
- 23.13 Retrieve and record stored diagnostic trouble codes.
- 23.14 Diagnose the causes of emissions or driveability problems resulting from failure of computerized engine controls with stored diagnostic trouble codes.

- 23.15 Inspect, test, adjust, and replace computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits.
- 23.16 Obtain and interpret digital multimeter (DMM) readings.
- 23.17 Access and use electronic service information (ESI).
- 23.18 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).
- 23.19 Inspect and test power and ground circuits and connections; service or replace as needed.
- 23.20 Practice recommended precautions when handling static sensitive devices.
- 23.21 Diagnose driveability and emissions problems resulting from failures of interrelated systems (cruise control, security alarms, torque controls, suspension controls, traction controls, torque management, A/C, automatic transmissions, and similar systems); determine necessary action.
- 23.22 Achieve product specific certification requirements for diagnostic scanner.
- 23.23 Achieve product specific certification requirements for PROM reprogramming systems.
- 23.24 Perform product specific OBD II drive cycle diagnostic tests.

### **Ignition System Diagnosis and Repair**

- 23.25 Diagnose no-starting, driveability, and emissions problems on vehicles with electronic ignition (distributorless) systems; determine necessary action.
- 23.26 Diagnose no-starting, driveability, and emissions problems on vehicles with distributor ignition (DI) systems; determine needed repairs.
- 23.27 Inspect and test ignition primary circuit wiring and components; repair or replace as needed.
- 23.28 Inspect and test distributor; service as needed.
- 23.29 Inspect and test ignition system secondary circuit wiring and components; replace as needed.
- 23.30 Inspect and test ignition coil(s); replace as needed.
- 23.31 Check and adjust (where applicable) ignition system timing and timing advance/retard.P-1
- 23.32 Inspect and test ignition wiring harness and connectors; replace as needed.
- 23.33 Inspect and test ignition system pick-up sensor or triggering devices; replace as needed.
- 23.34 Inspect and test ignition control module; replace as needed.
- 23.35 Achieve product specific certification requirements for specific ignition systems.
- 23.36 Service product specific ignition systems.

### **Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair**

- 23.37 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine needed action.
- 23.38 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine needed action.
- 23.39 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
- 23.40 Check fuel for contaminants and quality.

- 23.41 Inspect and test mechanical and electrical fuel pumps and pump control systems; replace as needed.
- 23.42 Replace fuel filters.
- 23.43 Inspect and test fuel pressure regulation system and components.
- 23.44 Inspect and test cold enrichment system components; adjust or replace as needed.
- 23.45 Remove, clean, and reinstall throttle body; adjust related linkages
- 23.46 Inspect and test fuel injectors; clean and replace.
- 23.47 Inspect throttle body mounting plates, air induction and filtration system, intake manifold, and gaskets; clean or replace as needed.
- 23.48 Check/adjust idle speed and fuel mixture where applicable.
- 23.49 Remove, inspect, and test vacuum and electrical components and connections of fuel system; repair or replace as needed.
- 23.50 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.
- 23.51 Perform exhaust system back-pressure test; determine needed action.
- 23.52 Test the operation of turbocharger/supercharger systems; determine needed action.
- 23.53 Remove, clean, inspect, and repair or replace turbocharger/supercharger system components.
- 23.54 Identify the causes of turbocharger/supercharger failure; determine needed action.
- 23.55 Achieve product specific certification requirements for fuel injection systems.
- 23.56 Service product specific fuel injection systems.

#### **Emissions Control Systems Diagnosis and Repair Positive Crankcase Ventilation**

- 23.57 Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system.
- 23.58 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.

#### **Exhaust Gas Recirculation**

- 23.59 Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system.
- 23.60 Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; service or replace as needed.
- 23.61 Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; service or replace as needed.
- 23.62 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; repair or replace as needed.

#### **Exhaust Gas Treatment**

- 23.63 Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems.
- 23.64 Inspect and test mechanical components of secondary air injection systems; service or replace as needed.
- 23.65 Inspect and test electrical/electronically-operated components and circuits of air injection systems; replace as needed.
- 23.66 Inspect and test components of catalytic converter systems; replace as needed.

#### **Intake Air Temperature Controls**

- 23.67 Diagnose emissions and driveability problems resulting from failure of the intake air temperature control systems.
- 23.68 Inspect and test components of intake air temperature control systems; replace as needed.

### **Early Fuel Evaporation (Intake Manifold Temperature) Controls**

- 23.69 Diagnose emissions and driveability problems resulting from failure of early fuel evaporation control systems.
- 23.70 Inspect and test components of early fuel evaporation control systems; service or replace as needed.

### **Evaporative Emissions Controls**

- 23.71 Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system.
- 23.72 Inspect and test components and hoses of evaporative emissions control system; replace as needed.

### **Engine Related Service**

- 23.73 Adjust valves on engines with mechanical or hydraulic lifters
- 23.74 Verify correct camshaft timing; determine needed action.
- 23.75 Verify engine operating temperature; determine needed action.
- 23.76 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or replace as needed.
- 23.77 Inspect and test thermostat, by-pass, and housing; replace as needed.
- 23.78 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or replace as needed.

July 2010

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Recreational Vehicle Service Technician  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I470698
CIP Number	0647.069900
Grade Level	30, 31
Standard Length	1000 hours
Teacher Certification	REC VEH SR @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3092, 49-9098
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### 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 the following: pre-delivery inspection, troubleshooting and repairing AC and DC electrical systems, freshwater systems, waste water systems, electrical brake systems, towing systems, suspension systems, vehicle interior, vehicle exterior, repair and service L.P systems, install vehicle accessories, service and repair appliances and air conditioning systems.

The content should include, but not be limited to, customer relations, communications, human relations, employability skills, and safe and efficient work practices.

## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ARR0071	Lot Porter	150	49-9098
B	ARR0072	Pre-delivery Inspection Technician	300	49-3092
	ARR0073	Recreational Vehicle Technician 1	275	49-3092
C	ARR0074	Recreational Vehicle Technician 2	275	49-3092

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### 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 program-specific OJT framework apply.

### Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program.

([www.fldoe.org/workforce/dwdframe/rtf/essential\\_skills.rtf](http://www.fldoe.org/workforce/dwdframe/rtf/essential_skills.rtf))

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns



credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Introduce recreational vehicle skills.
- 02.0 Apply electrical skills.
- 03.0 Apply mathematics skills.
- 04.0 Perform the pre-delivery inspection.
- 05.0 Perform preventive maintenance.
- 06.0 Troubleshoot and repair RV fluid power systems.
- 07.0 Identify basic heating and mechanical principles.
- 08.0 Troubleshoot L.P. gas systems.
- 09.0 Troubleshoot and repair electrical/electronics systems.
- 10.0 Perform metal processing/metallurgy skills.
- 11.0 Troubleshoot and repair water systems service.
- 12.0 Troubleshoot and repair electrical brake systems.
- 13.0 Troubleshoot and repair towing systems.
- 14.0 Troubleshoot and repair suspension system.
- 15.0 Troubleshoot and repair air conditioning systems.
- 16.0 Troubleshoot and repair absorption refrigerators.
- 17.0 Troubleshoot and repair heating systems.
- 18.0 Troubleshoot and repair water heaters.
- 19.0 Perform customer relations' functions.
- 20.0 Troubleshoot and repair vehicle interior.
- 21.0 Troubleshoot and repair vehicle exterior.
- 22.0 Demonstrate employability skills.
- 23.0 Demonstrate an understanding of entrepreneurship.

July 2010

**Florida Department of Education  
Student Performance Standards**

**Program Title: Recreational Vehicle Service Technician  
PSAV Number: I470698**

**Course Number: ARR0071  
Occupational Completion Point: A  
Lot Porter – 150 Hours – SOC Code 49-9098**

- 01.0 Introduce recreational vehicle skills--The student will be able to:
  - 01.01 Complete orientation to recreational vehicle industry.
  - 01.02 Apply basic safety procedures.
  - 01.03 Use basic trade tools and equipment.
  - 01.04 Apply industrial codes and standards.
  
- 19.0 Perform customer relations functions--The student will be able to:
  - 19.01 Apply customer service communications skills.
  - 19.02 Apply customer service techniques.
  
- 22.0 Demonstrate employability skills--The student will be able to:
  - 22.01 Conduct a job search.
  - 22.02 Secure information about a job.
  - 22.03 Identify documents which may be required when applying for a job interview.
  - 22.04 Complete a job application form correctly.
  - 22.05 Demonstrate competence in job interview techniques.
  - 22.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 22.07 Identify acceptable work habits.
  - 22.08 Demonstrate knowledge of how to make job changes appropriately.
  - 22.09 Demonstrate acceptable employee health habits.
  - 22.10 Demonstrate a knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).
  
- 23.0 Demonstrate an understanding of entrepreneurship--The student will be able to:
  - 23.01 Define entrepreneurship.
  - 23.02 Describe the importance of entrepreneurship to the American economy.
  - 23.03 List the advantages and disadvantages of business ownership.
  - 23.04 Identify the risks involved in ownership of a business.
  - 23.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 23.06 Identify the business skills needed to operate a small business efficiently and effectively.

**Course Number: ARR0072**  
**Occupational Completion Point: B**  
**Pre-delivery Inspection Technician – 300 Hours – SOC Code 49-3092**

- 02.0 Apply electrical skills--The student will be able to:
  - 02.01 Identify basic concepts of electrical circuits.
  - 02.02 Use electrical component symbols and diagrams.
  - 02.03 Identify component circuits and their requirements.
  - 02.04 Use electrical test meters.
  - 02.05 Use specialized hand tools.
  - 02.06 Apply DC principles.
  - 02.07 Apply soldering skills.
  - 02.08 Apply AC principles.
  
- 03.0 Apply mathematics skills--The student will be able to:
  - 03.01 Solve math problems involving fractions.
  - 03.02 Solve math problems involving algebraic equations.
  - 03.03 Use measurements.
  - 03.04 Solve basic trigonometric problems.
  
- 04.0 Perform the pre-delivery inspection--The student will be able to:
  - 04.01 Identify pre-delivery inspection procedures.
  - 04.02 Perform electrical system inspection.
  - 04.03 Perform LP gas system test.
  - 04.04 Perform water and drainage system check-out.
  - 04.05 Perform chassis, frame, and running gear inspection.
  
- 07.0 Identify basic heating and mechanical principles--The student will be able to:
  - 07.01 Explain basic principles of mechanical advantage.
  
- 08.0 Troubleshoot LP gas systems--The student will be able to:
  - 08.01 Identify properties of LP gas.
  - 08.02 Identify RV propane system components and functions.
  - 08.03 Inspect, purge, fill and test containers.
  
- 10.0 Perform metal processing/metallurgy skills--The student will be able to:
  - 10.01 Identify basic principles of metallurgy.
  
- 11.0 Troubleshoot and repair water systems service--The student will be able to:
  - 11.01 Identify RV water distribution system operations.
  
- 13.0 Troubleshoot and repair towing systems--The student will be able to:
  - 13.01 Identify RV towing systems.

- 14.0 Troubleshoot and repair suspension system--The student will be able to:
  - 14.01 Identify suspension system components.
- 15.0 Troubleshoot and repair air conditioning systems--The student will be able to:
  - 15.01 Analyze basic air conditioning refrigeration systems and theory.
  - 15.02 Test basic air condition/refrigeration systems.
- 16.0 Troubleshoot and repair absorption refrigerators--The student will be able to:
  - 16.01 Identify absorption systems theory.
- 17.0 Troubleshoot and repair heating systems--The student will be able to:
  - 17.01 Identify heating system theory.
- 18.0 Troubleshoot and repair water heaters--The student will be able to:
  - 18.01 Identify water heating systems theory.

**Course Number: ARR0073**  
**Recreational Vehicle Technician (1 of 2) – 275 Hours – SOC Code 49-3092**

- 02.0 Apply electrical skills--The student will be able to:
  - 02.09 Troubleshoot circuits containing electronic components.
  - 02.10 Troubleshoot/diagnose electrical circuits and components.
- 05.0 Perform preventive maintenance--The student will be able to:
  - 05.01 Perform under-the-hood inspections.
  - 05.02 Service cooling and oil lubricating systems.
  - 05.03 Perform general inspection and adjustments.
  - 05.04 Prepare vehicle for storage inspection and trip preparation.
- 06.0 Troubleshoot and repair RV fluid power systems--The student will be able to:
  - 06.01 Identify the principles of hydraulics.
  - 06.02 Identify hydraulic system components.
  - 06.03 Troubleshoot, repair and replace hydraulic system components.
  - 06.04 Identify principles of pneumatics.
  - 06.05 Identify pneumatic system components.
  - 06.06 Troubleshoot, repair and replace pneumatic system components.
- 07.0 Identify basic heating and mechanical principles--The student will be able to:
  - 07.02 Explain applications of energy converters.
  - 07.03 Perform efficiency calculations.

- 07.04 Explain basic principles of heat.
- 08.0 Troubleshoot LP gas systems--The student will be able to:
  - 08.02 Identify RV propane system components and functions.
  - 08.03 Inspect, purge, fill and test containers.
- 09.0 Troubleshoot and repair electrical/electronics systems--The student will be able to:
  - 09.01 Troubleshoot battery, alternator and charger.
  - 09.02 Troubleshoot and repair 120 volt AC distribution system.
  - 09.03 Troubleshoot 120 volt AC/12 volt converter systems.
  - 09.04 Troubleshoot and repair 12 volt distribution system.
  - 09.05 Perform gas engine generator tune up.
  - 09.06 Troubleshoot and repair generator alternators.
  - 09.07 Repair and install 12 volt motor and light fixtures.
  - 09.08 Install and troubleshoot antenna.
  - 09.09 Install and troubleshoot security system.
  - 09.10 Troubleshoot and repair leveling system.
  - 09.11 Troubleshoot and repair electrical steps.
  - 09.12 Troubleshoot and repair electronic systems.
- 10.0 Perform metal processing/metallurgy skills--The student will be able to:
  - 10.02 Perform stick electrode welding techniques.
  - 10.03 Perform oxyacetylene welding techniques.
  - 10.04 Perform MIG welding techniques.
  - 10.05 Perform TIG welding techniques.
  - 10.06 Perform cutting operations.
  - 10.07 Perform sheet metal forming techniques.
  - 10.08 Perform plastic welding and joining techniques.
- 11.0 Troubleshoot and repair water systems service--The student will be able to:
  - 11.02 Troubleshoot and repair fresh water components.
  - 11.03 Troubleshoot and repair plumbing fixtures.
  - 11.04 Troubleshoot and repair waste water components.
  - 11.05 Install water system.

**Course Number: ARR0074**

**Occupational Completion Point: C**

**Recreational Vehicle Technician (2 of 2) – 275 Hours – SOC Code 49-3092**

- 12.0 Troubleshoot and repair electrical brake systems--The student will be able to:
  - 12.01 Troubleshoot electrical brake systems.
  - 12.02 Repair electrical brake systems.
  - 12.03 Install electrical brake systems.
- 13.0 Troubleshoot and repair towing systems--The student will be able to:

- 13.02 Install towing systems.
- 13.03 Install wiring systems.
- 13.04 Troubleshoot and repair towing systems.
  
- 14.0 Troubleshoot and repair suspension system--The student will be able to:
  - 14.02 Install add-on suspension systems.
  - 14.03 Install steer safe devices.
  - 14.04 Troubleshoot and repair air suspension systems.
  - 14.05 Troubleshoot and repair rubber suspension systems.
  
- 15.0 Troubleshoot and repair air conditioning systems--The student will be able to:
  - 15.03 Troubleshoot and repair electrical circuits and components.
  - 15.04 Use brazing skills.
  - 15.05 Evacuate and recharge air conditioning system.
  - 15.06 Troubleshoot and repair refrigeration systems.
  - 15.07 Install air conditioner.
  
- 16.0 Troubleshoot and repair absorption refrigerators--The student will be able to:
  - 16.02 Troubleshoot cooling systems.
  - 16.03 Remove and install refrigerator cooling system.
  - 16.04 Troubleshoot and repair electrical systems.
  - 16.05 Troubleshoot and repair gas systems.
  
- 17.0 Troubleshoot and repair heating systems--The student will be able to:
  - 17.02 Troubleshoot and repair gravity-type furnace.
  - 17.03 Troubleshoot and repair pilot piezo-type furnace.
  - 17.04 Troubleshoot and repair direct spark ignition furnace.
  
- 18.0 Troubleshoot and repair water heaters--The student will be able to:
  - 18.02 Troubleshoot and repair electrical water heaters.
  - 18.03 Troubleshoot and repair manual pilot ignition water heaters.
  - 18.04 Troubleshoot and repair direct spark ignition water heaters.
  
- 20.0 Troubleshoot and repair vehicle interior--The student will be able to:
  - 20.02 Repair and replace cabinets, hardware and trim.
  - 20.03 Repair interior surface defects.
  - 20.04 Repair floors and floor coverings.
  - 20.05 Repair and install window coverings.
  - 20.06 Repair and replace interior front-end group.
  
- 21.0 Troubleshoot and repair vehicle exterior--The student will be able to:
  - 21.02 Repair and replace metal siding and roof.
  - 21.03 Repair and replace fiberglass surface components.

- 21.04 Paint and detail exterior surface.
- 21.05 Repair and replace canvas and screening.
- 21.06 Troubleshoot and repair roof lift mechanisms.
- 21.07 Repair and replace windows and frames.
- 21.08 Repair and replace hardware, doors and compartments.
- 21.09 Repair air and water leaks.
- 21.10 Repair and replace metal siding and roof.
- 21.11 Repair and replace fiberglass surface components.
- 21.12 Paint and detail exterior surface.
- 21.13 Repair and replace canvas and screening.
- 21.14 Troubleshoot and repair roof lift mechanisms.
- 21.15 Repair and replace windows and frames.
- 21.16 Repair and replace hardware, doors and compartments.
- 21.17 Repair air and water leaks.

July 2010

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Air Traffic Control  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I490105
CIP Number	0649010500
Grade Level	30, 31
Standard Length	1600 Hours
Teacher Certification	AIR CONT @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-2021
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 12.0 Language: 12.0 Reading: 12.0

### 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: human relations, communication skills, leadership skills, and employability skills, safe and efficient work practices, Federal Aviation Administration regulations, air traffic control procedures, aviation safety, flight psychology, meteorology, navigation and communications.

### Program Structure



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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ATT0825	Air Traffic Control Specialist 1	400	53-2021
B	ATT0826	Air Traffic Control Specialist 2	400	53-2021
C	ATT0827	Air Traffic Control Specialist 3	400	53-2021
D	ATT0828	Air Traffic Control Specialist 4	400	53-2021

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for initial employment as an air traffic control specialist.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Air Traffic Control industry; planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Students must meet physical and psychological standards required by the Federal Aviation Administration.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program.

([www.fldoe.org/workforce/dwdframe/rtf/essential\\_skills.rtf](http://www.fldoe.org/workforce/dwdframe/rtf/essential_skills.rtf))

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 12.0, Language 12.0, and Reading 12.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate an understanding of fundamentals of aeronautics.
- 02.0 Solve basic navigation situations.
- 03.0 Demonstrate an understanding of federal flight rules and regulations.
- 04.0 Develop an understanding of meteorology.
- 05.0 Interpret Federal Aviation Administration enroute and terminal charts and rules.
- 06.0 Demonstrate knowledge and understanding of aircraft engines and systems.
- 07.0 Demonstrate an understanding of aviation safety.
- 08.0 Demonstrate an understanding of aviation law.
- 09.0 Demonstrate appropriate communication skills.
- 10.0 Demonstrate appropriate math skills.
- 11.0 Demonstrate appropriate understanding of basic science.
- 12.0 Demonstrate employability skills.
- 13.0 Demonstrate an understanding of entrepreneurship.

July 2010

**Florida Department of Education  
Student Performance Standards**

**Program Title: Air Traffic Control**  
**PSAV Number: I490105**

**Course Number: ATT0825**  
**Occupational Completion Point: A**  
**Air Traffic Control Specialist (1 of 4) – 400 Hours – SOC Code 53-2021**

01.0 Demonstrate an understanding of fundamentals of aeronautics--The student will be able to:

- 01.01 Differentiate between aeronautics and aerodynamics.
- 01.02 State and give examples of Newton's three laws of motion.
- 01.03 Name and compare the four forces of flight.
- 01.04 Describe an airfoil.
- 01.05 State how lift is produced.
- 01.06 Discuss how and why an airplane stalls.
- 01.07 Describe and explain how pilot, vacuum, pressure and engine instruments work.
- 01.08 Explain the magnetic compass.

02.0 Solve basic navigation situations--The student will be able to:

- 02.01 Define radio navigation and be able to explain VOR and Ioran principles.
- 02.02 Define great circle, meridian, longitude, latitude and conic projection.
- 02.03 Explain and understand the sectional charts used in aviation.
- 02.04 Explain VOR navigation, radar, DME and RNAV principles.
- 02.05 Define radial, bearing, tacan, MEA, ASR, IFR, VFR and holding pattern.

03.0 Demonstrate an understanding of federal flight rules and regulations--The student will be able to:

- 03.01 Explain major portion of Parts I, 61, 67, 91 and 830 of the Federal Aviation Regulations.

**Course Number: ATT0826**  
**Occupational Completion Point: B**  
**Air Traffic Control Specialist (2 of 4) – 400 Hours – SOC Code 53-2021**

04.0 Develop an understanding of meteorology--The student will be able to:

- 04.01 State the correct names of the major civilian and military weather organizations.
- 04.02 Explain why the military needs its own weather service.
- 04.03 Name and state the function of at least three instruments meteorologists use in gathering weather data.
- 04.04 Name and describe two types of weather satellites.
- 04.05 Interpret weather surface charts, station sequence reports, terminal reports and area forecasts.

- 04.06 Analyze and predict weather using meteorology charts, maps and reports.
- 05.0 Interpret federal aviation administration enroute and terminal charts and rules--The student will be able to:
  - 05.01 Explain enroute charts and their legend.
  - 05.02 Explain terminal charts and understand the legend.
  - 05.03 Understand the parts 61, 91 of the Federal Aviation Regulations.
- 06.0 Demonstrate knowledge and understanding of aircraft engines and systems--The student will be able to:
  - 06.01 Identify and describe the parts of a reciprocating engine.
  - 06.02 Understand the difference between reciprocating engines and the jet engine.
  - 06.03 Define turbine and ramjet principles.
  - 06.04 Explain the electrical and hydraulic systems on small aircraft.

**Course Number: ATT0827**

**Occupational Completion Point: C**

**Air Traffic Control Specialist (3 of 4) – 400 Hours – SOC Code 53-2021**

- 07.0 Demonstrate an understanding of aviation safety--The student will be able to:
  - 07.01 Explain dangerous areas around jet aircraft, large propeller driven aircraft and around small general aviation aircraft.
  - 07.02 Identify dangerous weather conditions.
  - 07.03 Differentiate between various causes of airsickness.
  - 07.04 Explain the ATC system as it operates today and the safety aspects.
  - 07.05 Define hypoxia and hyperventilation and list the causes of each.
- 08.0 Demonstrate an understanding of aviation law--The student will be able to:
  - 08.01 Explain and define liability, pilot in command, owner and other terms used in aviation law.
  - 08.02 Explain the differences between civil and military law as it relates to aviation.
  - 08.03 List and describe the agencies both federal and international that affect aviation laws and regulations.
- 09.0 Demonstrate appropriate communication skills--The student will be able to:
  - 09.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 09.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 09.03 Read and follow written and oral instructions.
  - 09.04 Answer and ask questions coherently and concisely.
  - 09.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 09.06 Demonstrate appropriate telephone/communication skills.

**Course Number: ATT0828**  
**Occupational Completion Point: D**  
**Air Traffic Control Specialist (4 of 4) – 400 Hours – SOC Code 53-2021**

- 10.0 Demonstrate appropriate math skills--The student will be able to:
- 10.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 10.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 10.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 10.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 10.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 11.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 11.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 11.02 Draw conclusions or make inferences from data.
  - 11.03 Identify health-related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 11.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 12.0 Demonstrate employability skills--The student will be able to:
- 12.01 Conduct a job search.
  - 12.02 Secure information about a job.
  - 12.03 Identify documents, which may be required when applying for a job interview.
  - 12.04 Complete a job application form correctly.
  - 12.05 Demonstrate competence in job interview techniques.
  - 12.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 12.07 Identify acceptable work habits.
  - 12.08 Demonstrate knowledge of how to make appropriate job changes.
  - 12.09 Demonstrate acceptable employee health habits.
  - 12.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).
- 13.0 Demonstrate an understanding of entrepreneurship--The student will be able to.
- 13.01 Identify characteristics of the American enterprise system.
  - 13.02 Define inflation and deflation.
  - 13.03 Illustrate the basic economic questions facing any society.
  - 13.04 Determine the results of a change in demand or a change in supply.
  - 13.05 List factors, which contribute to economic growth.
  - 13.06 Identify characteristics of different types of business ownership.

13.07 Choose appropriate action in a situation requiring application of business ethics.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Heavy Equipment Operation  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I490202
CIP Number	0649.020200
Grade Level	30, 31
Standard Length	1200 Hours
Teacher Certification	OPER ENGR @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2073, 53-7021
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 8.0 Language: 8.0 Reading: 8.0

### 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, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, and skills to operate and maintain a variety of heavy equipment such as crawler tractors, motor graders, scrapers and shovels or cranes. Students training on one machine must complete all related program content.

### Program Structure



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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0070	Heavy Equipment Maintenance Technician	150	47-2073
B	TRA0086	Tractor Operator	150	47-2073
	TRA0087	Off-road Equipment Operator 1	300	47-2073
C	TRA0088	Off-road Equipment Operator 2	300	47-2073
D	TRA0049	Crane Operator	300	53-7021

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for initial employment with occupational titles as operating engineers (SOC 47-2073). **Schools may elect to train on heavy equipment unique to their Local employment area in OCP C and D as an instructional option.**

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Heavy Equipment industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Many areas of the state do not have the need to train crane operators. To assist business and industry and provide solutions for students needing training on alternative pieces of equipment; requiring the same number of hours (300), alternative equipment to meet the requirements of Occupational Completion Point D may be used.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 8.0, Language 8.0, and Reading 8.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate understanding of procedures.
- 02.0 Demonstrate understanding of operation and maintenance of mechanical systems and engines.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Demonstrate science knowledge and skills
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Operate pneumatic and crawler -type tractor with attachments.
- 07.0 Demonstrate language arts knowledge and skills
- 08.0 Solve problems using critical thinking skills, creativity and innovation.
- 09.0 Operate a back hoe.
- 10.0 Operate a motor grader.
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 12.0 Utilize utility construction equipment as applicable.
- 13.0 Use information technology tools
- 14.0 Describe the importance of professional ethics and legal responsibilities.

- 15.0 Demonstrate personal-- money-management concepts, procedures, and strategies
- 16.0 Operate a crane.
- 17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 18.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 19.0 Explain the importance of employability and entrepreneurship skills

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Heavy Equipment Operation**  
**PSAV Number: I490202**

**Course Number: TRA0070**  
**Occupational Completion Point: A**  
**Heavy Equipment Maintenance Technician – 150 Hours – SOC Code 47-2073**

- 01.0 Demonstrate understanding of procedures--The student will be able to:
- 01.01 Apply safety practices during operation of heavy equipment.
  - 01.02 Discuss function of each piece of heavy equipment as appropriate.
  - 01.03 Turn and back-up equipment safely.
  - 01.04 Operate equipment on roadway safely.
- 02.0 Demonstrate understanding of operation and maintenance of mechanical systems and engines--The student will be able to:
- 02.01 Perform preventive maintenance on equipment including greasing, changing oil, and replacing filters.
  - 02.02 Perform additional maintenance based on specific equipment needs.
  - 02.03 Safety check equipment prior to operation.
- 03.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 03.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 03.03 Construct charts/tables/graphs using functions and data. AF3.5
- 04.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 04.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 04.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 05.02 Locate, organize and reference written information from various sources. CM 3.0
  - 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0

- 05.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 05.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: TRA0086**  
**Occupational Completion Point: B**  
**Tractor Operator – 150 Hours – SOC Code 47-2073**

06.0 Operate pneumatic and crawler-type tractor with attachments--The student will be able to:

- 06.01 Move, level, and spread top soil.
- 06.02 Remove stumps.
- 06.03 Pile debris for burning.
- 06.04 Remove and replace dozer blade.
- 06.05 Remove and replace bucket.
- 06.06 Attach cutting teeth as needed.
- 06.07 Safely load dump trucks.

07.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0

- 07.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 07.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 07.03 Present information formally and informally for specific purposes and audiences. AF2.9

08.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

- 08.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 08.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 08.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 08.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

**Course Number: TRA0087**  
**Off-road Equipment Operator (1 of 2) – 300 Hours – SOC Code 47-2073**

09.0 Operate back hoe--The student will be able to:

- 09.01 Dig pit to specified grade.
- 09.02 Observe for cables, pipes, and underground utilities.
- 09.03 Dig ditches for drainage and pipes.
- 09.04 Install bucket teeth to back hoe

10.0 Operate a motor grader--The student will be able to:

- 10.01 Grade to specific levels.
- 10.02 Apply use of grading stakes when operating motor grade.

- 10.03 Build a road-bed.
  - 10.04 Perform blue-top grade (finish).
  - 10.05 Change blade and scarifier teeth on motor grader.
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 11.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 11.02 Explain emergency procedures to follow in response to workplace accidents.
  - 11.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: TRA0088****Occupational Completion Point: C****Off-road Equipment Operator (2 of 2) – 300 Hours – SOC Code 47-2073**

- 12.0 Utilize utility construction equipment as applicable--The student will be able to:
- 12.01 Operate scraper.
  - 12.02 Operate trencher.
  - 12.03 Operate tar kettle.
  - 12.04 Operate rollers.
  - 12.05 Operate concrete mixer.
- 13.0 Use information technology tools. -- The students will be able to:
- 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 14.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 14.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 14.02 Evaluate alternative responses to workplace situations based on personal,
    - 14.02.1 professional, ethical, legal responsibilities, and employer policies.ELR1.1
  - 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 14.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 15.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 15.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0

- 15.02 Describe the effect of money management on personal and career goals. FL 3.0
- 15.03 Develop a personal budget and financial goals. FL3.1
- 15.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 15.05 Maintain financial records. FL3.3
- 15.06 Read and reconcile financial statements. FL3.4
- 15.07 Research, compare and contrast investment opportunities.

**Course Number: TRA0049****Occupational Completion Point: D****Crane Operator – 300 Hours – SOC Code 53-7021**16.0 Operate crane or alternative equipment(operating engineer)--The student will be able to:

- 16.01 Apply safety procedures.
- 16.02 Review "Construction Industry Manufactures Association" safety manuals.
- 16.03 Operate crane with drag bucket, clamshell, and hook. (Optional)
- 16.04 Load dump truck with crane. (Optional)
- 16.05 Operate alternative equipment

17.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 17.01 Describe the nature and types of business organizations. SY 1.0
- 17.02 Explain the effect of key organizational systems on performance and quality.
- 17.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 17.04 Explain the impact of the global economy on business organizations.

18.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 18.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 18.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 18.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 18.04 Employ mentoring skills to inspire and teach others. LT 5.0

19.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 19.01 Identify and demonstrate positive work behaviors needed to be employable.ECD 1.0
- 19.02 Develop personal career plan that includes goals, objectives, and strategies.ECD 2.0
- 19.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 19.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 19.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 19.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 19.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 19.08 Research the benefits of ongoing professional development. ECD 9.0
- 19.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0



2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Solid Waste Collection Equipment Operator  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I490203
CIP Number	0649.029900
Grade Level	30, 31
Standard Length	150 hours
Teacher Certification	COMM DRIV @7 G OPER ENGR @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-7081
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/A

### 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 the following: operation of Class B vehicles; operation of automated waste truck; operation of right hand drive commercial vehicles; operation and loading procedure using automated arm extensions; and keeping records. The course content should also include instruction in human relations, leadership, communication, and employability skills, and safe, efficient work practices.

## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0071	Solid Waste Collection Equipment Operator	150	53-7081

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment as Solid Waste Collection Equipment Operators (SOC 53-7081).

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Solid Waste Collection industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Students entering this program must exhibit a safe driving record, be at least 19 years of age, hold a Class B Driver License, and pass a DOT physical exam and drug test.

## Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## 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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics: N/A, Language: N/A, and Reading: N/A. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the

student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Describe vehicle safety and accident prevention procedures.
- 02.0 Comply with vehicle operating regulations.
- 03.0 Demonstrate pre-trip preparation procedures.
- 04.0 Demonstrate equipment inspection procedures.
- 05.0 Perform vehicle maintenance and servicing procedures.
- 06.0 Demonstrate operation of material collection equipment.
- 07.0 Demonstrate basic vehicle control procedures.
- 08.0 Demonstrate backing.
- 09.0 Demonstrate basic vehicle maneuvers.
- 10.0 Demonstrate road driving skills.
- 11.0 Describe hazardous driving skills.
- 12.0 Demonstrate language arts knowledge and skills
- 13.0 Demonstrate mathematics knowledge and skills.
- 14.0 Demonstrate science knowledge and skills
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 16.0 Solve problems using critical thinking skills, creativity and innovation.
- 17.0 Use information technology tools
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.

- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 21.0 Describe the importance of professional ethics and legal responsibilities.
- 22.0 Explain the importance of employability and entrepreneurship skills
- 23.0 Demonstrate personal money-management concepts, procedures, and strategies

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Solid Waste Collection Equipment Operator  
PSAV Number: I490203**

**Course Number: TRA0071  
Occupational Completion Point: A  
Solid Waste Collection Equipment Operator – 150 Hours – SOC Code 53-7081**

01.0 Describe vehicle safety and accident prevention procedures--The student will be able to:

- 01.01 Understand, identify and explain the use of vehicle safety equipment.
- 01.02 Explain the use of fire extinguishers.
- 01.03 Utilize seat belts and personal protection gear appropriate to type of operation.
- 01.04 Describe safe lifting procedures.
- 01.05 Understand accident reporting requirements (company, state, federal).
- 01.06 Identify all information needed for accident reports to the State, the employer and the insurance company.
- 01.07 Complete an accident report.
- 01.08 Describe procedures for protecting the scene of an accident.
- 01.09 Identify types of hazardous cargoes.
- 01.10 Describe liability requirements.
- 01.11 Identify hazardous road conditions that are a potential threat to the safety of the truck driver.
- 01.12 Describe activities and characteristics of other road users that make them potentially dangerous.
- 01.13 Describe the potential consequences of excessive speed.
- 01.14 Describe the potential consequences of use of drugs or alcohol.
- 01.15 Describe and demonstrate safety procedures for entering and exiting vehicles.

02.0 Understand and comply with vehicle operating regulations--The student will be able to:

- 02.01 Understand and comply with Hours of Service regulations.
- 02.02 Maintain a complete, neat and accurate driver's duty status log.
- 02.03 Keep accurate records required by hours of service regulations.
- 02.04 Perform mathematical calculations necessary to recap and apply totals to the hours of service regulations.
- 02.05 Determine driving hours remaining on a particular day or tour of duty.
- 02.06 Understand and comply with applicable United States Department of Transportation regulations.
- 02.07 Understand and comply with Florida Department of Transportation regulations.
- 02.08 Understand and comply with state and local traffic laws including restrictions on vehicle size and weight.
- 02.09 Identify permit requirements.

03.0 Demonstrate pre-trip preparation procedures--The student will be able to:

- 03.01 Check accident report packets for proper contents.

- 03.02 Plan a route from one point to another that is optimal in terms of travel time, fuel costs, potential hazards and federal, state and local travel restrictions.
- 03.03 Arrange a secure place for vehicle on layovers, especially when transporting hazardous materials.
- 03.04 Demonstrate map reading skills.
- 03.05 Estimate travel time and plan rest stops and layovers.
- 03.06 Estimate fuel consumption and plan fuel stops.

04.0 Demonstrate equipment inspection procedures--The student will be able to:

- 04.01 Check vehicle for registration and permits.
- 04.02 Check general appearance and condition of vehicle.
- 04.03 Check fuel, oil, water levels and automatic transmission fluid level, coolant, battery, and filters.
- 04.04 Check signal lights, stoplights and running lights.
- 04.05 Check tires, rims and suspension.
- 04.06 Check horn, windshield wipers, mirrors and reflectors.
- 04.07 Check emergency flares and fire extinguishers.
- 04.08 Check instruments for normal readings.
- 04.09 Check steering system, brake action and tractor protection valve.
- 04.10 Check material handling apparatus.
- 04.11 Perform enroute inspections of mirrors, instrument panel, engine and power train, suspension system and brakes.
- 04.12 Perform post-trip inspection of vehicle and all systems.

05.0 Perform vehicle maintenance and servicing procedures--The student will be able to:

- 05.01 Describe function and operation of principle vehicle systems including, engine, engine auxiliary brake, drive train, coupling, suspension and electrical system.
- 05.02 Check engine fuel, oil, coolant, battery and filters.
- 05.03 Check tire air pressure.
- 05.04 Change wheels (with tires mounted) and check for proper tire and wheel mounting.
- 05.05 Drain moisture from air brake supply reservoirs.
- 05.06 Check brakes.
- 05.07 Clean and repair lights.
- 05.08 Check fuses and reset circuit breakers.
- 05.09 Clean interior and exterior of vehicle.
- 05.10 Check and replace mud/rain flaps.
- 05.11 Maintain material hopper.
- 05.12 Maintain chassis.

06.0 Demonstrate operation of material collection equipment—The student will be able to:

- 06.01 Describe function and operation of principle material collection equipment.
- 06.02 Demonstrate proper procedure for engaging the hydraulic pump.
- 06.03 Demonstrate proper use of packer control stations.
- 06.04 Demonstrate proper use of emergency stop controls.
- 06.05 Demonstrate proper use of start cycle controls.
- 06.06 Demonstrate proper use of retraction controls.
- 06.07 Demonstrate proper use of engine speed controls.

- 06.08 Demonstrate proper use of multi-cycle controls.
- 06.09 Demonstrate proper use of console selector controls.
- 06.10 Demonstrate proper use of speed-up inhibitor controls.
- 06.11 Demonstrate proper use of hoist controls.
- 06.12 Demonstrate proper use of standard tailgated controls.
- 06.13 Demonstrate proper use of crusher panel controls.
- 06.14 Demonstrate proper use of cart tipper controls.
- 06.15 Demonstrate proper use of panic bar controls.
- 06.16 Demonstrate proper use of chute controls.
- 06.17 Demonstrate safe operation of packing system.
- 06.18 Describe function of hopper assembly.
- 06.19 Describe procedure for handling recycling containers.
- 06.20 Explain use of roller carts.
- 06.21 Describe pack on the go.
- 06.22 Demonstrate safe operation of the lifting arm.

07.0 Demonstrate basic vehicle control procedures--The student will:

- 07.01 Place transmission in neutral before starting engine.
- 07.02 Start, warm up and shut down the engine, according to the manufacturer's specifications.
- 07.03 Build full pressure (90-120 PSI) in air tanks before starting.
- 07.04 Test parking brake and service brake before starting.
- 07.05 Coordinate use of accelerator and clutch to achieve smooth acceleration and avoid clutch abuse.
- 07.06 Maintain proper engine RPM while driving.
- 07.07 Properly modulate air brakes to bring vehicle to a smooth stop.
- 07.08 Shift up and down through all gears.
- 07.09 Double clutch and time shift for smooth and fuel efficient performance.
- 07.10 Select proper gear for speed and highway conditions.
- 07.11 Operate automatic and semiautomatic transmissions.
- 07.12 Coordinate steering, braking and acceleration to take the vehicle through a desired path forward and backward in a straight line.
- 07.13 Use clutch and gears to slow vehicle.
- 07.14 Park the vehicle, set brakes and shut off the engine.
- 07.15 Properly check/block wheels where and when required.

08.0 Demonstrate backing skills--The student will:

- 08.01 Check area before backing.
- 08.02 Properly utilize guides and mirrors.
- 08.03 Properly back in straight line and curved paths.
- 08.04 Properly back into an alley dock.
- 08.05 Properly parallel park.
- 08.06 Judge side, rear and overhead clearances.

09.0 Demonstrate basic vehicle maneuvers--The student will be able to:

- 09.01 Make a straight-in approach to an alley.
- 09.02 Drive forward through an alley for 100 feet.
- 09.03 Properly stop the unit within 12 inches of the end of the alley.



- 09.04 Back 100 feet through an alley.
- 09.05 Properly stop the unit within 12 inches of the end of the alley.
- 09.06 Make proper straight in approach to multiple curves (serpentine).
- 09.07 Drive forward through curves (serpentine) while keeping tires inside of line.
- 09.08 Properly position unit for backing into a loading dock.
- 09.09 Properly back to a dock.
- 09.10 Properly stop unit within 12 inches of the dock without contacting dock.
- 09.11 Properly enter a weighing platform.

10.0 Demonstrate road driving skills--The student will be able to:

- 10.01 Carefully enter traffic from parked position.
- 10.02 Use clutch and gears properly.
- 10.03 Proceed from a stopped position without rolling backward.
- 10.04 Use mirrors properly.
- 10.05 Signal intention to turn well in advance.
- 10.06 Get into proper lane well in advance of turn.
- 10.07 Check traffic conditions and turn only when intersection is clear.
- 10.08 Restrict traffic from passing on right when preparing to complete a right hand turn.
- 10.09 Complete a turn promptly and safely and not impede other traffic.
- 10.10 Select and shift to proper gear prior to beginning any turn.
- 10.11 Obey all traffic signals.
- 10.12 Plan stop in advance and adjust speed correctly.
- 10.13 Use brakes properly on grades.
- 10.14 Plan stop far enough in advance to avoid hard braking.
- 10.15 Stop clear of crosswalks.
- 10.16 Come to a complete stop at all stop signs.
- 10.17 Yield right of way at intersections having yield signs.
- 10.18 Check for cross traffic regardless of traffic signals.
- 10.19 Enter all intersections prepared to stop if necessary.
- 10.20 Stop a minimum of 15 feet but not more than 50 feet before railroad grade crossing if stop is necessary.
- 10.21 Select proper gear to avoid shifting gears on railroad grade crossing.
- 10.22 Determine sufficient space required for passing.
- 10.23 Pass only in safe locations.
- 10.24 Pass on two-lane highway.
- 10.25 Pass on four or more lane highway.
- 10.26 Signal lane changes before and after passing.
- 10.27 Pass only when appropriate to avoid impeding other traffic.
- 10.28 Return to right lane promptly, but only when safe to do so.
- 10.29 Observe speed limits.
- 10.30 Adjust speed properly to road, weather and traffic conditions.
- 10.31 Slow down in advance of curves, danger zones and intersections.
- 10.32 Maintain consistent speed where possible.
- 10.33 Yield right of way.
- 10.34 Allow faster traffic to pass.
- 10.35 Use horn only when necessary.
- 10.36 Park only in legally permissible parking areas.
- 10.37 Check instruments at regular intervals.
- 10.38 Maintain proper engine RPM while driving.

- 10.39 Determine minimum front-to-rear distances when following other vehicles.
- 11.0 Describe hazardous driving skills--The student will be able to:
- 11.01 Describe preparation for operation in cold weather, including removing snow and ice from windows, mirrors, brakes, lights, hand and toe holds, etc; when necessary.
  - 11.02 Demonstrate proper procedure for expelling moisture from the air tanks after each trip.
  - 11.03 Describe proper procedure for checking ice accumulation on brakes, slack adjuster, air hoses, electrical wiring during operation.
  - 11.04 Describe operational adjustments necessary to maintain control in all weather conditions, including speed selection, braking and following distance.
  - 11.05 Describe procedures to check safe operation of brakes after driving through deep water.
  - 11.06 Perform proper use of windshield wipers, washers and defrosters to maintain visibility.
  - 11.07 Observe and evaluate changing road surface conditions.
  - 11.08 Demonstrate ability for recognizing conditions that produce low traction, including initial rainfall, ice, snow and mud.
  - 11.09 Describe procedures to avoid skidding.
  - 11.10 Describe procedures to avoid hydroplaning and describe the road and vehicle conditions that produce it.
  - 11.11 Describe procedures for mounting and dismounting tire chains.
  - 11.12 Describe procedures for extricating the vehicle from snow, sand and mud by maneuvering or towing.
  - 11.13 Demonstrate ability to adjust rate of change in speed and direction to accommodate road conditions to avoid skidding.
  - 11.14 Describe procedures required to coordinate acceleration and shifting to overcome the resistance of snow, sand and mud.
  - 11.15 Demonstrate ability to perform checks on brake adjustment prior to mountain driving.
  - 11.16 Describe procedures required to use right lane or special truck lane going up grades.
  - 11.17 Describe procedures required to place transmission in appropriate gear for engine braking before starting downgrade.
  - 11.18 Describe procedures required to use proper braking techniques and maintain proper engine braking before starting downgrades.
  - 11.19 Describe proper use of truck escape ramp when brakes fail on a downgrade.
  - 11.20 Describe procedure required for observing temperature gauge frequently when pulling heavy loads up long grades.
  - 11.21 Describe the effect of vehicle weight and speed upon braking and shifting ability on long downgrades.
  - 11.22 Identify the meaning and use of percent of grade signs.
  - 11.23 Demonstrate bringing the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface.
  - 11.24 Describe procedures to make an evasive turn off the roadway and return to the roadway while maintaining directional control.
  - 11.25 Describe procedures to bring the vehicle to a stop in the event of a brake failure.
  - 11.26 Describe procedures to maintain control of the vehicle in the event of a blowout.

- 11.27 Describe procedures to bring truck to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface.
- 11.28 Describe procedures to recover from vehicle skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces.
- 11.29 Describe procedures to countersteer out of a skid in a way that will regain directional control and not produce another skid.
- 11.30 Describe procedure to operate brakes properly to provide maximum braking without loss of control.
- 12.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 12.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 12.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 12.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 13.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 13.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 13.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 13.03 Construct charts/tables/graphs using functions and data. AF3.5
- 14.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 14.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 14.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 15.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 15.02 Locate, organize and reference written information from various sources. CM 3.0
- 15.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 15.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 15.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 15.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 15.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 16.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 16.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 16.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0

- 16.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 16.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 17.0 Use information technology tools. -- The students will be able to:
- 17.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 17.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 17.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 17.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 18.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 18.01 Describe the nature and types of business organizations. SY 1.0
- 18.02 Explain the effect of key organizational systems on performance and quality.
- 18.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 18.04 Explain the impact of the global economy on business organizations.
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 19.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 19.02 Explain emergency procedures to follow in response to workplace accidents.
- 19.03 Create a disaster and/or emergency response plan. SHE 2.0
- 20.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 20.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 20.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 20.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 20.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 21.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 21.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 21.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 21.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 21.04 Interpret and explain written organizational policies and procedures. ELR 2.0

22.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 22.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 22.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 22.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 22.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 22.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 22.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 22.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 22.08 Research the benefits of ongoing professional development. ECD 9.0
- 22.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

23.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:

- 23.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 23.02 Describe the effect of money management on personal and career goals. FL 3.0
- 23.03 Develop a personal budget and financial goals. FL3.1
- 23.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 23.05 Maintain financial records. FL3.3
- 23.06 Read and reconcile financial statements. FL3.4
- 23.07 Research, compare and contrast investment opportunities.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Commercial Vehicle Driving  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I490205
CIP Number	0649.020500
Grade Level	30, 31
Standard Length	320 Hours
Teacher Certification	COMM DRIV @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-3032
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/A

### 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 the following: Loading and unloading cargo; reporting delays or accidents on the road; verifying load against shipping papers; and keeping records. The course content should also include instruction in human relations, leadership, communication, and employability skills, and safe, efficient work practices.

### Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0080	Tractor Trailer Truck Driver	320	53-3032

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for employment as tractor trailer/truck drivers, (SOC 53-3032).

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Commercial Vehicle Driving industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Students entering this program must exhibit a safe driving record, be at least 19 years of age and comply with State and Federal licensing requirements. Instruction will include 1000 miles of road driving under the supervision of a qualified commercial vehicle driver prior to completion of the program. Road driving activities will include experience on two-lane, four-lane, interstate, and city streets and highways. Twenty percent or more of the experience will occur at night on both wet and dry roads. Instruction in driving bob-tail, empty and loaded vehicles will be given.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics: N/A, Language: N/A, and Reading: N/A. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the



student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Describe vehicle safety and accident prevention procedures.
- 02.0 Comply with vehicle operating regulations.
- 03.0 Demonstrate proper cargo handling and documentation procedures.
- 04.0 Demonstrate pre-trip preparation procedures.
- 05.0 Demonstrate vehicle inspection procedures.
- 06.0 Perform vehicle maintenance and servicing procedures.
- 07.0 Demonstrate basic vehicle control procedures.
- 08.0 Demonstrate backing, coupling and uncoupling skills.
- 09.0 Demonstrate basic vehicle maneuvers.
- 10.0 Demonstrate road driving skills.
- 11.0 Describe hazardous driving skills.
- 12.0 Demonstrate mathematics knowledge and skills.
- 13.0 Demonstrate science knowledge and skills
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 15.0 Explain the importance of employability and entrepreneurship skills
- 16.0 Obtain a Florida Commercial Vehicle Drivers License by passing written and performance tests.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Commercial Vehicle Driving**  
**PSAV Number: I490205**

**Course Number: TRA0080**  
**Occupational Completion Point: A**  
**Tractor Trailer Truck Driver – 320 Hours – SOC Code 53-3032**

01.0 Describe vehicle safety and accident prevention procedures--The student will be able to:

- 01.01 Understand, identify and explain the use of vehicle safety equipment.
- 01.02 Explain the use of fire extinguishers and fire fighting procedures..
- 01.03 Utilize seat belts and personal protection gear appropriate to type of operation.
- 01.04 Describe safe lifting procedures.
- 01.05 Describe personal safety equipment and procedures.
- 01.06 Describe actions applicable for vehicle accidents.
- 01.07 Describe accident reporting requirements (company, state, federal).
- 01.08 Identify all information needed for accident reports to the State, the employer and the insurance company.
- 01.09 Complete an accident report.
- 01.10 Describe procedures for protecting the scene of an accident.
- 01.11 Identify types of hazardous cargoes.
- 01.12 Describe personal liability requirements.
- 01.13 Identify hazardous road conditions that are a potential threat to the safety of the tractor trailer driver.
- 01.14 Describe activities and characteristics of other road users that make them potentially dangerous.
- 01.15 Describe the potential consequences of excessive speed.
- 01.16 Describe the potential consequences of use of drugs or alcohol.
- 01.17 Describe and demonstrate safety procedures for mounting and dismounting cab-over-engine tractors.

02.0 Understand and comply with vehicle operating regulations--The student will be able to:

- 02.01 Understand and comply with Hours of Service regulations.
- 02.02 Maintain a complete, neat and accurate driver's duty status log.
- 02.03 Keep accurate records required by hours of service regulations.
- 02.04 Perform mathematical calculations necessary to recap and apply totals to the hours of service regulations.
- 02.05 Determine driving hours remaining on a particular day or tour of duty.
- 02.06 Understand and comply with applicable United States Department of Transportation regulations.
- 02.07 Understand and comply with Florida Department of Transportation regulations.
- 02.08 Understand and comply with state and local traffic laws including restrictions on vehicle size and weight.
- 02.09 Identify permit requirements.

- 03.0 Demonstrate proper cargo handling and documentation procedures--The student will be able to:
- 03.01 Load and unload cargo safely and efficiently.
  - 03.02 Obtain gross weight and axle weight.
  - 03.03 Describe cargo load to meet legal weight and safety requirements.
  - 03.04 Secure cargo using blocking, bracing, packing, rope, cable, chains and strapping.
  - 03.05 Mount placards when carrying hazardous materials.
  - 03.06 Describe procedure for use of common cargo handling equipment, including pallets, jacks, dollies, handtrucks, nets, slings, poles and other equipment.
  - 03.07 Identify categories of hazardous materials and the need for specialized training to handle hazardous materials.
  - 03.08 Identify hazardous materials documentation requirements.
  - 03.09 Verify nature, amount and condition of cargo on both pickup and delivery.
  - 03.10 Verify information on bill of lading and properly record and report discrepancies and damage to the cargo.
  - 03.11 Obtain appropriate signatures on delivery receipts and other required forms.
  - 03.12 Prepare a manifest.
  - 03.13 Handle C.O.D. shipments.
  - 03.14 Verify door seal number against shipping document.
  - 03.15 Comply with port of entry or exit and other inspection station procedures.
- 04.0 Demonstrate pre-trip preparation procedures--The student will be able to:
- 04.01 Check and secure tractor trailer or vehicle permit.
  - 04.02 Check accident report packets for proper contents.
  - 04.03 Plan a route from one point to another that is optimal in terms of travel time, fuel costs, potential hazards and federal, state and local travel restrictions.
  - 04.04 Arrange to secure permits required by the nature of the vehicle, its cargo and route to be traveled.
  - 04.05 Arrange a secure place for vehicle on layovers, especially when transporting hazardous materials.
  - 04.06 Demonstrate map reading skills.
  - 04.07 Estimate travel time and plan rest stops and layovers.
  - 04.08 Estimate fuel consumption and plan fuel stops.
  - 04.09 Estimate expense money and obtain funds and/or credit cards.
- 05.0 Demonstrate vehicle inspection procedures--The student will be able to:
- 05.01 Check general appearance and condition of vehicle.
  - 05.02 Check fuel, oil, water levels and automatic transmission fluid level.
  - 05.03 Check signal lights, stop lights and running lights.
  - 05.04 Check tires, rims and suspension.
  - 05.05 Check horn, windshield wipers, mirrors and reflectors.
  - 05.06 Check fifth wheel, trailer hook-up and brake lines.
  - 05.07 Check emergency flares and fire extinguishers.
  - 05.08 Check instruments for normal readings.
  - 05.09 Check steering system, brake action and tractor protection valve.
  - 05.10 Check cargo blocking, bracing and tie down.
  - 05.11 Perform enroute inspections of mirrors, instrument panel, engine and power train, suspension system and brakes.

05.12 Perform post-trip inspection of vehicle and all systems.

06.0 Perform vehicle maintenance and servicing procedures--The student will be able to:

06.01 Describe function and operation of principle vehicle systems including, engine, engine auxiliary brake, drive train, coupling, suspension and electrical system.

06.02 Check engine fuel, oil, coolant, battery and filters.

06.03 Check tire air pressure.

06.04 Change wheels (with tires mounted) and check for proper tire and wheel mounting.

06.05 Drain moisture from air brake supply reservoirs.

06.06 Check and adjust brakes.

06.07 Clean and repair lights.

06.08 Change fuses and reset circuit breakers.

06.09 Clean interior and exterior of vehicle.

06.10 Check and replace mud/rain flaps.

06.11 Check and adjust tandem and fifth-wheel slides, if so equipped.

07.0 Demonstrate basic vehicle control procedures--The student will:

07.01 Place transmission in neutral before starting engine.

07.02 Start, warm up and shut down the engine, according to the manufacturer's specifications.

07.03 Build full pressure (90-120 PSI) in air tanks before starting.

07.04 Test parking brake and service brake before starting.

07.05 Coordinate use of accelerator and clutch to achieve smooth acceleration and avoid clutch abuse.

07.06 Maintain proper engine RPM while driving.

07.07 Properly modulate air brakes to bring vehicle to a smooth stop.

07.08 Shift up and down through all gears of all major types of conventional transmissions.

07.09 Double clutch and time shift for smooth and fuel efficient performance.

07.10 Select proper gear for speed and highway conditions.

07.11 Operate automatic and semiautomatic transmissions.

07.12 Coordinate steering, braking and acceleration to take the vehicle through a desired path forward and backward in a straight line.

07.13 Adequately judge the path trailer will take (off-tracking) as vehicle negotiates left or right curves and turns.

07.14 Use clutch and gears to slow vehicle.

07.15 Park the vehicle, set brakes and shut off the engine.

07.16 Properly check/block wheels where and when required.

08.0 Demonstrate backing, coupling and uncoupling skills--The student will:

08.01 Check area before backing.

08.02 Properly utilize guides and mirrors.

08.03 Properly back in straight line and curved paths.

08.04 Properly back into an alley dock.

08.05 Properly parallel park.

08.06 Park in a jackknife position.

08.07 Judge side, rear and overhead clearances and path of the trailer.

- 08.08 Reverse-steer and articulate a vehicle.
- 08.09 Align the tractor properly to connect with trailer.
- 08.10 Back and secure the tractor properly into the trailer kingpin without damage.
- 08.11 Perform mechanical and visual checks to make sure coupling is secure.
- 08.12 Connect electrical and air lines properly.
- 08.13 Set in-cab air brake controls properly.
- 08.14 Retract and secure landing gear after coupling is secure.
- 08.15 Properly uncouple and secure the trailer, to include doubles.

09.0 Demonstrate basic vehicle maneuvers--The student will be able to:

- 09.01 Make a straight-in approach to an alley.
- 09.02 Drive forward through an alley for 100 feet.
- 09.03 Properly stop the unit within 12 inches of the end of the alley.
- 09.04 Back 100 feet through an alley.
- 09.05 Properly stop the unit within 12 inches of the end of the alley.
- 09.06 Make proper straight in approach to multiple curves (serpentine).
- 09.07 Drive forward through curves (serpentine) while keeping tires inside of line.
- 09.08 Properly position unit for backing into a loading dock.
- 09.09 Properly back to a dock.
- 09.10 Properly stop unit within 12 inches of the dock without contacting dock.
- 09.11 Properly enter a weighing platform.
- 09.12 Properly maneuver double bottom trailers.

10.0 Demonstrate road driving skills--The student will be able to:

- 10.01 Carefully enter traffic from parked position.
- 10.02 Use clutch and gears properly.
- 10.03 Proceed from a stopped position without rolling backward.
- 10.04 Use mirrors properly.
- 10.05 Signal intention to turn well in advance.
- 10.06 Get into proper lane well in advance of turn.
- 10.07 Check traffic conditions and turn only when intersection is clear.
- 10.08 Restrict traffic from passing on right when preparing to complete a right hand turn.
- 10.09 Complete a turn promptly and safely and not impede other traffic.
- 10.10 Select and shift to proper gear prior to beginning any turn.
- 10.11 Obey all traffic signals.
- 10.12 Plan stop in advance and adjust speed correctly.
- 10.13 Use brakes properly on grades.
- 10.14 Plan stop far enough in advance to avoid hard braking.
- 10.15 Stop clear of crosswalks.
- 10.16 Come to a complete stop at all stop signs.
- 10.17 Yield right of way at intersections having yield signs.
- 10.18 Check for cross traffic regardless of traffic signals.
- 10.19 Enter all intersections prepared to stop if necessary.
- 10.20 Stop a minimum of 15 feet but not more than 50 feet before railroad grade crossing if stop is necessary.
- 10.21 Select proper gear to avoid shifting gears on railroad grade crossing.
- 10.22 Determine sufficient space required for passing.
- 10.23 Pass only in safe locations.

- 10.24 Pass on two-lane highway.
- 10.25 Pass on four or more lane highway.
- 10.26 Signal lane changes before and after passing.
- 10.27 Warn driver ahead of intention to pass.
- 10.28 Pass only when appropriate to avoid impeding other traffic.
- 10.29 Return to right lane promptly, but only when safe to do so.
- 10.30 Observe speed limits.
- 10.31 Adjust speed properly to road, weather and traffic conditions.
- 10.32 Slow down in advance of curves, danger zones and intersections.
- 10.33 Maintain consistent speed where possible.
- 10.34 Yield right of way.
- 10.35 Allow faster traffic to pass.
- 10.36 Use horn only when necessary.
- 10.37 Park only in legally permissible parking areas.
- 10.38 Check instruments at regular intervals.
- 10.39 Maintain proper engine RPM while driving.
- 10.40 Demonstrate ability to properly maneuver double bottom trailers on two lane and four lane highways.
- 10.41 Determine minimum front-to-rear distances when following other vehicles.

11.0 Demonstrate hazardous driving skills--The student will be able to:

- 11.01 Describe preparation for operation in cold weather, including activating the front brake limiting valve; removing snow and ice from windows, mirrors, brakes, lights, hand and toe holds, etc; and installing tire chains when necessary.
- 11.02 Demonstrate proper procedure for expelling moisture from the air tanks after each trip.
- 11.03 Describe proper procedure for checking ice accumulation on brakes, slack adjuster, air hoses, electrical wiring and radiator shutters during operation.
- 11.04 Describe operational adjustments necessary to maintain control in all weather conditions, including speed selection, braking and following distance.
- 11.05 Describe procedures to check safe operation of brakes after driving through deep water.
- 11.06 Perform proper use of windshield wipers, washers and defrosters to maintain visibility.
- 11.07 Observe and evaluate changing road surface conditions.
- 11.08 Demonstrate ability for recognizing conditions that produce low traction, including initial rainfall, ice, snow and mud.
- 11.09 Describe procedures to avoid skidding and jackknifing.
- 11.10 Describe procedures to avoid hydroplaning and describe the road and vehicle conditions that produce it.
- 11.11 Describe procedures for mounting and dismounting tire chains.
- 11.12 Describe procedures for extricating the vehicle from snow, sand and mud by maneuvering or towing.
- 11.13 Demonstrate ability to adjust rate of change in speed and direction to accommodate road conditions to avoid skidding.
- 11.14 Describe procedures required to coordinate acceleration and shifting to overcome the resistance of snow, sand and mud.
- 11.15 Demonstrate ability to perform checks on brake adjustment prior to mountain driving.

- 11.16 Describe procedures required to use right lane or special truck lane going up grades.
  - 11.17 Describe procedures required to place transmission in appropriate gear for engine braking before starting downgrade.
  - 11.18 Describe procedures required to use proper braking techniques and maintain proper engine braking before starting downgrades.
  - 11.19 Describe proper use of truck escape ramp when brakes fail on a downgrade.
  - 11.20 Describe procedure required for observing temperature gauge frequently when pulling heavy loads up long grades.
  - 11.21 Describe the effect of vehicle weight and speed upon braking and shifting ability on long downgrades.
  - 11.22 Identify the meaning and use of percent of grade signs.
  - 11.23 Demonstrate bringing the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface.
  - 11.24 Describe procedures to make an evasive turn off the roadway and return to the roadway while maintaining directional control.
  - 11.25 Describe procedures to bring the vehicle to a stop in the event of a brake failure.
  - 11.26 Describe procedures to maintain control of the vehicle in the event of a blowout.
  - 11.27 Describe procedures to bring tractor trailer to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface.
  - 11.28 Describe procedures to recover from vehicle skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces.
  - 11.29 Describe procedures to countersteer out of a skid in a way that will regain directional control and not produce another skid.
  - 11.30 Describe procedure to operate brakes properly to provide maximum braking without loss of control.
- 12.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 12.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 12.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 12.03 Construct charts/tables/graphs using functions and data. AF3.5
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- 14.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 14.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
  
- 15.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
  - 15.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 15.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 15.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 15.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 15.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 15.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 15.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 15.08 Research the benefits of ongoing professional development. ECD 9.0
  - 15.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
  
- 16.0 Obtain a Florida commercial vehicle drivers license by passing written and performance test--The student will be able to:
  - 16.01 Demonstrate competence in performing basic commercial vehicle driving skills.
  - 16.02 Demonstrate understanding and knowledge of Florida Commercial Vehicle Driving Laws as required, to safely and legally operate a commercial vehicle.



2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** School Bus Driver Training  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I490215
CIP Number	0649.020501
Grade Level	30, 31
Standard Length	40 hours
Teacher Certification	SC BS DR T @7G COMM DRIV @7G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-3022
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/A

### **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, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, operation of buses, loading, unloading, and transporting students, reporting delays or accidents on the road, and keeping records.

## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0085	Bus Driver, School	40	53-3022

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment as school bus drivers, (SOC 53-3022).

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the School Bus Driver Training industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

## Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## 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 program-specific OJT framework apply.

## Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all

career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program.

([www.fldoe.org/workforce/dwdframe/rtf/essential\\_skills.rtf](http://www.fldoe.org/workforce/dwdframe/rtf/essential_skills.rtf))

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics: N/A, Language: N/A, and Reading: N/A. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the

student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Perform pre-trip inspection of vehicle.
- 02.0 Perform recordkeeping.
- 03.0 Place vehicle in motion.
- 04.0 Slow and stop vehicle.
- 05.0 Operate vehicle safely and efficiently in traffic, passing and turning.
- 06.0 Exhibit good general driving ability and habits.
- 07.0 Demonstrate ability to give emergency first aid.
- 08.0 Demonstrate appropriate communication skills.
- 09.0 Demonstrate appropriate math skills.
- 10.0 Demonstrate appropriate understanding of basic science.
- 11.0 Demonstrate employability skills.
- 12.0 Demonstrate an understanding of entrepreneurship.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: School Bus Driver Training  
PSAV Number: I490215**

**Course Number: TRA0085  
Occupational Completion Point: A  
Bus Driver, School – 40 Hours – SOC Code 53-3022**

01.0 Perform pre-trip inspection of vehicle--The student will be able to:

- 01.01 Check for and interpret fluid leaks on the ground.
- 01.02 Check for underinflated, flat, worn, or damaged tires.
- 01.03 Check for loose or missing lug nuts.
- 01.04 Check the physical appearance of the bus.
- 01.05 Check the engine compartment fluid levels.
- 01.06 Check the condition of the engine compartment drive belts.
- 01.07 Check the condition of the engine wiring harness.
- 01.08 Check the condition of the spark plug wires.
- 01.09 Check the condition of all hoses.
- 01.10 Properly check the fire extinguisher.
- 01.11 Check the condition of the first aid kit.
- 01.12 Check quantity and secure mounting of the reflective triangles.
- 01.13 Properly adjust the driver's seat and seatbelt.
- 01.14 Check and adjust all mirrors.
- 01.15 Check brake system for proper vacuum or air pressure.
- 01.16 Assure adequate fuel level for the trip.
- 01.17 Check for adequate oil pressure.
- 01.18 Check the charging system for proper operation.
- 01.19 Determine that the engine cooling system is operating normally.
- 01.20 Check the directional signals.
- 01.21 Check the pupil warning lights.
- 01.22 Check the tail lights.
- 01.23 Check the interior bus lights.
- 01.24 Check the defrosters.
- 01.25 Check the heater system.
- 01.26 Check the service door.
- 01.27 Check the emergency door.
- 01.28 Check the clearance and I.D. lights.
- 01.29 Check the stop lights.
- 01.30 Check the emergency flashers.
- 01.31 Check the headlights.
- 01.32 Check the stop arm and lights.
- 01.33 Check the operation of the horn.
- 01.34 Inspect the bus interior for cleanliness.
- 01.35 Check the exhaust system for leaks.
- 01.36 Perform an operational test of the brake system.
- 01.37 Check for unusual or strong odors.
- 01.38 Check for loose or too stiff steering.

02.0 Perform recordkeeping--The student will be able to:

- 02.01 Keep the route book up to date.
- 02.02 Prepare an accident report.
- 02.03 Report any unsafe conditions on the county-developed bus inspection form.
- 02.04 Note all times and odometer readings on the field trip form.
- 02.05 Perform any other recordkeeping as required by the Transportation Department.

03.0 Place vehicle in motion--The student will be able to:

- 03.01 Insert key in ignition.
- 03.02 Close the doors.
- 03.03 Adjust the driver's seat.
- 03.04 Adjust the driver's seat belt.
- 03.05 Check the mirrors for proper adjustment.
- 03.06 Set the parking brake.
- 03.07 Place gear selector in neutral for manual shift; neutral or park for automatic.
- 03.08 Press clutch (manual shift).
- 03.09 Turn key to start position and release when the engine starts.
- 03.10 Place a vehicle with a standard transmission in motion.
- 03.11 Place a vehicle with an automatic transmission in motion.

04.0 Slow and stop vehicle--The student will be able to:

- 04.01 Check and evaluate traffic conditions.
- 04.02 Position the vehicle appropriately.
- 04.03 Release the accelerator.
- 04.04 Brake to a smooth stop.
- 04.05 Press clutch just prior to a complete stop (manual shift).
- 04.06 Shift to an appropriate gear position.
- 04.07 Set the parking brake.
- 04.08 Turn off all accessories and ignition.

05.0 Operate vehicle safely and efficiently in traffic, passing, and turning--The student will be able to:

- 05.01 Determine safe following distances under all weather conditions.
- 05.02 Demonstrate proper procedures for crossing railroad tracks.
- 05.03 Demonstrate knowledge of which driver must yield the right-of-way in various situations.
- 05.04 Demonstrate proper knowledge and understanding of green, yellow and red traffic signals.
- 05.05 Explain when passing on the right and on the left is permitted and/or prohibited.
- 05.06 Demonstrate ability to make a right turn.
- 05.07 Demonstrate ability to make a left turn.

06.0 Exhibit good general driving ability and habits--The student will be able to:

- 06.01 Identify the meaning of the standard colors used on traffic signs.
- 06.02 Identify the meaning of the standard shapes used on traffic signs.

- 06.03 Identify standard roadway markings.
  - 06.04 Identify and list a set of principles for preventing and correcting any kind of traction loss.
  - 06.05 Explain the correct response for loss of brakes.
  - 06.06 Explain the correct response for steering failure.
  - 06.07 Explain the correct response for tire blow-out.
  - 06.08 Explain the correct response for headlight failure.
  - 06.09 Explain the correct response for accelerator sticking.
  - 06.10 Explain the correct response for engine overheating.
  - 06.11 Identify the three classifications of fires and name the types of fire extinguishers for each.
  - 06.12 Explain emergency evacuation procedures.
  - 06.13 Explain the requirements and correct procedures for staking out a disabled school bus.
  - 06.14 Explain the legal requirements and recommendations on stop locations for loading and unloading passengers.
  - 06.15 Describe the proper and improper use of the alternately flashing red and amber pupil warning lights.
  - 06.16 Correctly sequence the necessary actions for loading passengers on the highway or street.
  - 06.17 Correctly sequence the necessary actions for loading passengers on school or other private property.
  - 06.18 Correctly sequence the necessary actions for loading passengers at a turn-around stop.
  - 06.19 Correctly sequence the necessary actions for unloading passengers on school or other private property.
  - 06.20 Correctly sequence the necessary actions for unloading passengers on the highway or street.
  - 06.21 Correctly sequence the necessary actions for unloading passengers at a turn-around stop.
  - 06.22 Explain the procedure for reporting motorists who illegally pass the bus when loading and unloading passengers.
  - 06.23 Explain the importance of maintaining an accurate time schedule.
  - 06.24 Describe the nature of young people.
  - 06.25 Describe the stages of human development.
  - 06.26 Explain how desires, fears, and drives of young people motivate their behavior.
  - 06.27 Identify common characteristics of people and describe how to deal with these characteristics.
  - 06.28 Identify negative roadblocks to effective communications with students.
  - 06.29 Identify driver actions that affect positive student behavior.
  - 06.30 State the responsibilities of the passenger management team members.
  - 06.31 Explain how to communicate important information to exceptional education children.
  - 06.32 Explain how to handle behavior problems with special education children.
  - 06.33 Explain how to handle health problems with exceptional education children.
  - 06.34 Explain when and how exceptional children should be evacuated from a school bus.
  - 06.35 Explain the proper treatment for handling on-board seizures.
  - 06.36 Explain the use and importance of the medical information card.
- 07.0 Demonstrate the ability to give first aid--The student will be able to:

- 07.01 Explain and demonstrate the proper procedure for mouth-to-mouth and mouth-to-nose resuscitation.
  - 07.02 Explain and demonstrate the proper procedure for clearing an obstructed airway.
  - 07.03 Explain and demonstrate the proper methods of controlling bleeding.
  - 07.04 Identify the symptoms of shock and explain the proper procedure for treating shock.
  - 07.05 Explain the proper treatment for eye injuries, vomiting, mouth or face injuries, fainting, falls, and epileptic seizures.
  - 07.06 Identify the location and contents of the first aid kit.
- 08.0 Demonstrate appropriate communication skills--The student will be able to:
- 08.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 08.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
  - 08.03 Read and follow written and oral instructions.
  - 08.04 Answer and ask questions coherently and concisely.
  - 08.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
  - 08.06 Demonstrate appropriate telephone/communication skills.
- 09.0 Demonstrate appropriate math skills--The student will be able to:
- 09.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 09.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 09.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 09.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 09.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 10.0 Demonstrate appropriate understanding of basic science--The student will be able to:
- 10.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 10.02 Draw conclusions or make inferences from data.
  - 10.03 Identify health related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 10.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 11.0 Demonstrate employability skills--The student will be able to:
- 11.01 Conduct a job search.
  - 11.02 Secure information about a job.
  - 11.03 Identify documents, which may be required when applying for a job interview.



- 11.04 Complete a job application form correctly.
- 11.05 Demonstrate competence in job interview techniques.
- 11.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
- 11.07 Identify acceptable work habits.
- 11.08 Demonstrate knowledge of how to make appropriate job changes.
- 11.09 Demonstrate acceptable employee health habits.
- 11.10 Demonstrate knowledge of the "Right-To-Know Law".

12.0 Demonstrate an understanding of entrepreneurship--The student will be able to:

- 12.01 Identify characteristics of the American enterprise system.
- 12.02 Define inflation and deflation.
- 12.03 Illustrate the basic economic questions facing any society.
- 12.04 Determine the results of a change in demand or a change in supply.
- 12.05 List factors which, contribute to economic growth.
- 12.06 Identify characteristics of different types of business ownership.
- 12.07 Choose appropriate action in a situation requiring application of business ethics.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Commercial Class “B” Driving  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	I490251
CIP Number	0649.020502
Grade Level	30, 31
Standard Length	150 hours
Teacher Certification	COMM DRIV @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-3033
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/A

### **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 the following: operation of Class B vehicles; loading and unloading cargo; reporting delays or accidents on the road; verifying load against shipping papers; and keeping records. The course content should also include instruction in human relations, leadership, communication, and employability skills, and safe, efficient work practices.

### **Program Structure**

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0084	Truck Driver Heavy Florida Class "B"	150	53-3033

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for a Florida Class B License Truck Driver Heavy.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Commercial Vehicle Driving industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Students entering this program must exhibit a safe driving record, be at least 19 years of age and comply with State and Federal licensing requirements. Instruction will include 200 miles of road driving under the supervision of a qualified commercial vehicle driver prior to completion of the program. Road driving activities will include experience on two-lane, four-lane, interstate, and city streets and highways. Twenty percent or more of the experience will occur at night on both wet and dry roads.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics: N/A, Language: N/A, and Reading: N/A. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

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Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the

student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Describe vehicle safety and accident prevention procedures.
- 02.0 Comply with vehicle operating regulations.
- 03.0 Demonstrate proper cargo handling and documentation procedures.
- 04.0 Demonstrate pre-trip preparation procedures.
- 05.0 Demonstrate vehicle inspection procedures.
- 06.0 Perform vehicle maintenance and servicing procedures.
- 07.0 Demonstrate basic vehicle control procedures.
- 08.0 Demonstrate backing.
- 09.0 Demonstrate basic vehicle maneuvers.
- 10.0 Demonstrate road driving skills.
- 11.0 Describe hazardous driving skills.
- 12.0 Demonstrate mathematics knowledge and skills.
- 13.0 Demonstrate science knowledge and skills
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 15.0 Explain the importance of employability and entrepreneurship skills
- 16.0 Obtain a Florida Class B Commercial Vehicle Drivers License by passing written and performance tests.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Commercial Class “B” Driving  
PSAV Number: I490251**

**Course Number: TRA0084  
Occupational Completion Point: A  
Truck Driver Heavy Florida Class “B” – 150 Hours – SOC Code 53-3033**

- 01.0 Describe vehicle safety and accident prevention procedures--The student will be able to:
- 01.01 Understand, identify and explain the use of vehicle safety equipment.
  - 01.02 Explain the use of fire extinguishers.
  - 01.03 Utilize seat belts and personal protection gear appropriate to type of operation.
  - 01.04 Describe safe lifting procedures.
  - 01.05 Understand accident reporting requirements (company, state, federal).
  - 01.06 Identify all information needed for accident reports to the State, the employer and the insurance company.
  - 01.07 Complete an accident report.
  - 01.08 Describe procedures for protecting the scene of an accident.
  - 01.09 Identify types of hazardous cargoes.
  - 01.10 Describe liability requirements.
  - 01.11 Identify hazardous road conditions that are a potential threat to the safety of the truck driver.
  - 01.12 Describe activities and characteristics of other road users that make them potentially dangerous.
  - 01.13 Describe the potential consequences of excessive speed.
  - 01.14 Describe the potential consequences of use of drugs or alcohol.
  - 01.15 Describe and demonstrate safety procedures for entering and exiting vehicles.
- 02.0 Understand and comply with vehicle operating regulations--The student will be able to:
- 02.01 Understand and comply with Hours of Service regulations.
  - 02.02 Maintain a complete, neat and accurate driver's duty status log.
  - 02.03 Keep accurate records required by hours of service regulations.
  - 02.04 Perform mathematical calculations necessary to recap and apply totals to the hours of service regulations.
  - 02.05 Determine driving hours remaining on a particular day or tour of duty.
  - 02.06 Understand and comply with applicable United States Department of Transportation regulations.
  - 02.07 Understand and comply with Florida Department of Transportation regulations.
  - 02.08 Understand and comply with state and local traffic laws including restrictions on vehicle size and weight.
  - 02.09 Identify permit requirements.
- 03.0 Demonstrate proper cargo handling and documentation procedures--The student will be able to:
- 03.01 Understand legal gross weight and axle weight.

- 03.02 Mount placards when carrying hazardous materials.
  - 03.03 Describe procedure for use of common cargo handling equipment, including pallets, jacks, dollies, handtrucks, nets, slings, poles and other equipment.
  - 03.04 Identify categories of hazardous materials and the need for specialized training to handle hazardous materials.
  - 03.05 Identify hazardous materials documentation requirements.
  - 03.06 Verify nature, amount and condition of cargo on both pickup and delivery.
  - 03.07 Verify information on bill of lading and properly record and report discrepancies and damage to the cargo.
  - 03.08 Obtain appropriate signatures on delivery receipts and other required forms.
  - 03.09 Prepare a bill of loading.
  - 03.10 Verify door seal number against shipping document.
  - 03.11 Comply inspection station procedures.
- 04.0 Demonstrate pre-trip preparation procedures--The student will be able to:
- 04.01 Check accident report packets for proper contents.
  - 04.02 Plan a route from one point to another that is optimal in terms of travel time, fuel costs, potential hazards and federal, state and local travel restrictions.
  - 04.03 Arrange a secure place for vehicle on layovers, especially when transporting hazardous materials.
  - 04.04 Demonstrate map reading skills.
  - 04.05 Estimate travel time and plan rest stops and layovers.
  - 04.06 Estimate fuel consumption and plan fuel stops.
- 05.0 Demonstrate vehicle inspection procedures--The student will be able to:
- 05.01 Check vehicle for registration and permits.
  - 05.02 Check general appearance and condition of vehicle.
  - 05.03 Check fuel, oil, water levels and automatic transmission fluid level, coolant, battery, and filters.
  - 05.04 Check signal lights, stoplights and running lights.
  - 05.05 Check tires, rims and suspension.
  - 05.06 Check horn, windshield wipers, mirrors and reflectors.
  - 05.07 Check emergency flares and fire extinguishers.
  - 05.08 Check instruments for normal readings.
  - 05.09 Check steering system, brake action and tractor protection valve.
  - 05.10 Check cargo blocking, bracing and tie down.
  - 05.11 Perform enroute inspections of mirrors, instrument panel, engine and power train, suspension system and brakes.
  - 05.12 Perform post-trip inspection of vehicle and all systems.
- 06.0 Perform vehicle maintenance and servicing procedures--The student will be able to:
- 06.01 Describe function and operation of principle vehicle systems including, engine, engine auxiliary brake, drive train, coupling, suspension and electrical system.
  - 06.02 Check engine fuel, oil, coolant, battery and filters.
  - 06.03 Check tire air pressure.
  - 06.04 Change wheels (with tires mounted) and check for proper tire and wheel mounting.
  - 06.05 Drain moisture from air brake supply reservoirs.

- 06.06 Check brakes.
- 06.07 Clean and repair lights.
- 06.08 Check fuses and reset circuit breakers.
- 06.09 Clean interior and exterior of vehicle.
- 06.10 Check and replace mud/rain flaps.

07.0 Demonstrate basic vehicle control procedures--The student will:

- 07.01 Place transmission in neutral before starting engine.
- 07.02 Start, warm up and shut down the engine, according to the manufacturer's specifications.
- 07.03 Build full pressure (90-120 PSI) in air tanks before starting.
- 07.04 Test parking brake and service brake before starting.
- 07.05 Coordinate use of accelerator and clutch to achieve smooth acceleration and avoid clutch abuse.
- 07.06 Maintain proper engine RPM while driving.
- 07.07 Properly modulate air brakes to bring vehicle to a smooth stop.
- 07.08 Shift up and down through all gears.
- 07.09 Double clutch and time shift for smooth and fuel efficient performance.
- 07.10 Select proper gear for speed and highway conditions.
- 07.11 Operate automatic and semiautomatic transmissions.
- 07.12 Coordinate steering, braking and acceleration to take the vehicle through a desired path forward and backward in a straight line.
- 07.13 Use clutch and gears to slow vehicle.
- 07.14 Park the vehicle, set brakes and shut off the engine.
- 07.15 Properly check/block wheels where and when required.

08.0 Demonstrate backing skills--The student will:

- 08.01 Check area before backing.
- 08.02 Properly utilize guides and mirrors.
- 08.03 Properly back in straight line and curved paths.
- 08.04 Properly back into an alley dock.
- 08.05 Properly parallel park.
- 08.06 Judge side, rear and overhead clearances.

09.0 Demonstrate basic vehicle maneuvers--The student will be able to:

- 09.01 Make a straight-in approach to an alley.
- 09.02 Drive forward through an alley for 100 feet.
- 09.03 Properly stop the unit within 12 inches of the end of the alley.
- 09.04 Back 100 feet through an alley.
- 09.05 Properly stop the unit within 12 inches of the end of the alley.
- 09.06 Make proper straight in approach to multiple curves (serpentine).
- 09.07 Drive forward through curves (serpentine) while keeping tires inside of line.
- 09.08 Properly position unit for backing into a loading dock.
- 09.09 Properly back to a dock.
- 09.10 Properly stop unit within 12 inches of the dock without contacting dock.
- 09.11 Properly enter a weighing platform.

10.0 Demonstrate road driving skills--The student will be able to:



- 10.01 Carefully enter traffic from parked position.
  - 10.02 Use clutch and gears properly.
  - 10.03 Proceed from a stopped position without rolling backward.
  - 10.04 Use mirrors properly.
  - 10.05 Signal intention to turn well in advance.
  - 10.06 Get into proper lane well in advance of turn.
  - 10.07 Check traffic conditions and turn only when intersection is clear.
  - 10.08 Restrict traffic from passing on right when preparing to complete a right hand turn.
  - 10.09 Complete a turn promptly and safely and not impede other traffic.
  - 10.10 Select and shift to proper gear prior to beginning any turn.
  - 10.11 Obey all traffic signals.
  - 10.12 Plan stop in advance and adjust speed correctly.
  - 10.13 Use brakes properly on grades.
  - 10.14 Plan stop far enough in advance to avoid hard braking.
  - 10.15 Stop clear of crosswalks.
  - 10.16 Come to a complete stop at all stop signs.
  - 10.17 Yield right of way at intersections having yield signs.
  - 10.18 Check for cross traffic regardless of traffic signals.
  - 10.19 Enter all intersections prepared to stop if necessary.
  - 10.20 Stop a minimum of 15 feet but not more than 50 feet before railroad grade crossing if stop is necessary.
  - 10.21 Select proper gear to avoid shifting gears on railroad grade crossing.
  - 10.22 Determine sufficient space required for passing.
  - 10.23 Pass only in safe locations.
  - 10.24 Pass on two-lane highway.
  - 10.25 Pass on four or more lane highway.
  - 10.26 Signal lane changes before and after passing.
  - 10.27 Pass only when appropriate to avoid impeding other traffic.
  - 10.28 Return to right lane promptly, but only when safe to do so.
  - 10.29 Observe speed limits.
  - 10.30 Adjust speed properly to road, weather and traffic conditions.
  - 10.31 Slow down in advance of curves, danger zones and intersections.
  - 10.32 Maintain consistent speed where possible.
  - 10.33 Yield right of way.
  - 10.34 Allow faster traffic to pass.
  - 10.35 Use horn only when necessary.
  - 10.36 Park only in legally permissible parking areas.
  - 10.37 Check instruments at regular intervals.
  - 10.38 Maintain proper engine RPM while driving.
  - 10.39 Determine minimum front-to-rear distances when following other vehicles.
- 11.0 Demonstrate hazardous driving skills--The student will be able to:
- 11.01 Describe preparation for operation in cold weather, including removing snow and ice from windows, mirrors, brakes, lights, hand and toe holds, etc; when necessary.
  - 11.02 Demonstrate proper procedure for expelling moisture from the air tanks after each trip.

- 11.03 Describe proper procedure for checking ice accumulation on brakes, slack adjuster, air hoses, electrical wiring during operation.
  - 11.04 Describe operational adjustments necessary to maintain control in all weather conditions, including speed selection, braking and following distance.
  - 11.05 Describe procedures to check safe operation of brakes after driving through deep water.
  - 11.06 Perform proper use of windshield wipers, washers and defrosters to maintain visibility.
  - 11.07 Observe and evaluate changing road surface conditions.
  - 11.08 Demonstrate ability for recognizing conditions that produce low traction, including initial rainfall, ice, snow and mud.
  - 11.09 Describe procedures to avoid skidding.
  - 11.10 Describe procedures to avoid hydroplaning and describe the road and vehicle conditions that produce it.
  - 11.11 Describe procedures for mounting and dismounting tire chains.
  - 11.12 Describe procedures for extricating the vehicle from snow, sand and mud by maneuvering or towing.
  - 11.13 Demonstrate ability to adjust rate of change in speed and direction to accommodate road conditions to avoid skidding.
  - 11.14 Describe procedures required to coordinate acceleration and shifting to overcome the resistance of snow, sand and mud.
  - 11.15 Demonstrate ability to perform checks on brake adjustment prior to mountain driving.
  - 11.16 Describe procedures required to use right lane or special truck lane going up grades.
  - 11.17 Describe procedures required to place transmission in appropriate gear for engine braking before starting downgrade.
  - 11.18 Describe procedures required to use proper braking techniques and maintain proper engine braking before starting downgrades.
  - 11.19 Describe proper use of truck escape ramp when brakes fail on a downgrade.
  - 11.20 Describe procedure required for observing temperature gauge frequently when pulling heavy loads up long grades.
  - 11.21 Describe the effect of vehicle weight and speed upon braking and shifting ability on long downgrades.
  - 11.22 Identify the meaning and use of percent of grade signs.
  - 11.23 Demonstrate bringing the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface.
  - 11.24 Describe procedures to make an evasive turn off the roadway and return to the roadway while maintaining directional control.
  - 11.25 Describe procedures to bring the vehicle to a stop in the event of a brake failure.
  - 11.26 Describe procedures to maintain control of the vehicle in the event of a blowout.
  - 11.27 Describe procedures to bring truck to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface.
  - 11.28 Describe procedures to recover from vehicle skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces.
  - 11.29 Describe procedures to countersteer out of a skid in a way that will regain directional control and not produce another skid.
  - 11.30 Describe procedure to operate brakes properly to provide maximum braking without loss of control.
- 12.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

- 12.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 12.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 12.03 Construct charts/tables/graphs using functions and data. AF3.5
- 13.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 13.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 13.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 14.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 14.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 14.02 Locate, organize and reference written information from various sources. CM 3.0
- 14.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 14.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 14.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 14.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 14.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 15.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 15.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 15.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 15.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 15.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 15.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 15.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 15.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 15.08 Research the benefits of ongoing professional development. ECD 9.0
- 15.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 16.0 Obtain a Florida commercial vehicle drivers license by passing written and performance test--The student will be able to:
- 16.01 Demonstrate competence in performing basic commercial vehicle driving skills.
- 16.02 Demonstrate understanding and knowledge of Florida Commercial Vehicle Driving Laws as required, to safely and legally operate a commercial vehicle.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Collision Repair and Refinishing 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T400100
CIP Number	0647.060303
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	AUTO IND @7G AUTO BODY @7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3021
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: basic trade skills; refinishing skills; sheetmetal repair skills; frame and unibody squaring and aligning; use of fillers; paint systems and undercoats; related welding skills; related mechanical skills; trim-hardware maintenance; glass servicing; and other miscellaneous repairs. The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
	ARR0210	Paint and Body Helper	250	49-3021
A	ARR0213	Paint and Body Assistant	250	49-3021
B	ARR0020	Auto Collision Estimator	100	49-3021
C	ARR0313	Frame and Body Repairman	150	49-3021

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment as automotive body, related repairers, automobile body repairers (SOC 49-3021).

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

## Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## 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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the

student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate vehicle and industry knowledge, business management, and shop and occupational safety skills.
- 02.0 Prepare vehicles for repair and refinishing.
- 03.0 Repair, replace and adjust outer body panels.
- 04.0 Demonstrate mathematics knowledge and skills.
- 05.0 Demonstrate science knowledge and skills
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 07.0 Perform welding operations.
- 08.0 Prepare surfaces for refinishing.
- 09.0 Select and apply appropriate paints and finishes.
- 10.0 Demonstrate language arts knowledge and skills
- 11.0 Solve problems using critical thinking skills, creativity and innovation.
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 13.0 Use information technology tools
- 14.0 Describe the importance of professional ethics and legal responsibilities.
- 15.0 Demonstrate personal money-management concepts, procedures, and strategies
- 16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives

- 18.0 Explain the importance of employability and entrepreneurship skills
- 19.0 Setup vehicle for measuring and pulling.
- 20.0 Inspect, measure and repair unibody vehicles.
- 21.0 Inspect and repair frame type vehicle bodies.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Collision Repair and Refinishing 1**  
**PSAV Number: T400100**

**Course Number: ARR0210**  
**Paint And Body Helper – 250 Hours – SOC Code 49-3021**

01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:

- 01.01 Comply with safety rules established by OSHA, NIOSH, EPA, and DER regarding chemicals and hazardous materials.
- 01.02 Comply with safety rules established by OSHA and NIOSH regarding personal clothing and devices.
- 01.03 Comply with safety rules regarding hand tools and power equipment and use them properly, including fire extinguishers.
- 01.04 Comply with locally developed shop safety rules and regulations.
- 01.05 Identify sources of airborne contamination and other hazards.
- 01.06 Select proper spray mask; inspect the spray mask to insure proper fit and operation; inspect the condition of the mask filters and other components.
- 01.07 Explain the "Right to Know Law" as applicable to auto body repair occupations.
- 01.08 Identify vehicle parts by name, location and function.
- 01.09 Read and explain damage reports.

02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:

- 02.01 Remove, replace and align damaged outside trim and moldings.
- 02.02 Remove, replace and align damaged or necessary inside trim and moldings.
- 02.03 Remove, replace and align damaged, non-structural body panels and components that may interfere with or be damaged during repair.
- 02.04 Protect panels and parts adjacent to repair area to prevent damage.
- 02.05 Remove dirt, grease and wax from those areas to be repaired.
- 02.06 Remove dirt, corrosion, under coatings, sealers, and/or other protective coatings necessary to perform repairs to structural areas.
- 02.07 Remove, replace, and align repairable plastics and other parts that are recommended for off-car repair.
- 02.08 Locate, read and interpret automobile manufacturers' data plates.

03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.01 Remove, replace and adjust a bolted panel or panel assembly.
- 03.02 Remove, replace and align hoods, hood hinges and hood latches.
- 03.03 Remove, replace and align deck lids, lid hinges and lid latches.
- 03.04 Remove, replace and align doors, tailgates, and hatches, lift gates and hinges.
- 03.05 Remove and replace bumpers, reinforcements, guards, isolators, and mounting hardware (release pressure from gas- and oil-filled energy-absorbing-type bumper isolators that are being discarded).

- 03.06 Check door hinge condition, replace hinge pins and bushings as needed, check door frames, check and adjust door clearances (where adjustable) along quarter panels, doors, rocker panels, fenders and tops.
- 03.07 Check and adjust latch assemblies on all hinged components.
- 04.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
  - 04.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 04.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 04.03 Construct charts/tables/graphs using functions and data. AF3.5
- 05.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
  - 05.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
  - 05.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 06.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
  - 06.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 06.02 Locate, organize and reference written information from various sources. CM 3.0
  - 06.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 06.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 06.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 06.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 06.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: ARR0213**

**Occupational Completion Point: A**

**Paint and Body Assistant – 250 Hours – SOC Code 49-3021**

- 07.0 Perform Welding Operations--The student will be able to:
  - 07.01 Demonstrate welding safety procedures.
- 08.0 Prepare Surfaces For Refinishing--The student will be able to:
  - 08.01 Inspect and identify types of finishes and surface conditions and develop a plan for refinishing using one paint system from start to finish in conformance with paint system manufacturer specifications.
  - 08.02 Gain access to, remove and store trim and molding.
  - 08.03 Remove dirt, wax and road grime from areas to be refinished and adjacent surfaces including complete washing of the vehicle.
  - 08.04 Mask and protect other areas that will not be refinished.

- 08.05 Mix primer, primer surfacer or primer sealer and spray onto the surface of repaired areas including two components and self-etching primers.
  - 08.06 Apply glazing putty to minor surface imperfections.
  - 08.07 Select proper abrasives and dry or wet sand area to which primer-surfacer and glazing putty have been applied.
  - 08.08 Compound around the edges of repaired areas to be refinished.
  - 08.09 Remove dust from areas to be refinished including cracks or moldings of adjacent areas.
  - 08.10 Clean area to be refinished with a proper solution.
  - 08.11 Remove, with a tack rag, any dust or lint particles from the areas to be refinished.
- 09.0 Select And Apply Appropriate Paints And Finishes--The student will be able to:
- 09.01 Sand, buff and polish finishes.
  - 09.02 Clean and detail a vehicle after completion of refinishing.
- 10.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 10.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 10.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 10.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 11.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 11.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 11.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 11.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 11.04 Conduct technical research to gather information necessary for decision-making.PS 4.0
- 12.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 12.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 12.02 Explain emergency procedures to follow in response to workplace accidents.
  - 12.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: ARR0020**

**Occupational Completion Point: B**

**Auto Collision Estimator – 100 Hours – SOC Code 49-3021**

01.0 Demonstrate Vehicle And Industry Knowledge, Business Management, And Shop And Occupational Safety Skills--The student will be able to:

- 01.10 Operate basic office machines.
- 01.11 Demonstrate basic keyboarding skills and computer usage.

- 01.12 Determine acceptable parts to use: new, used or aftermarket.
- 01.13 Prepare damage reports manually to industry standards.
- 01.14 Prepare damage reports to industry standards using a computer.
- 02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:
  - 02.09 Use specification and crash manuals including "P" pages.
- 13.0 Use information technology tools. -- The students will be able to:
  - 13.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 13.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 13.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 13.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 14.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
  - 14.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 14.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR 1.1
  - 14.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR 1.2
  - 14.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 15.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
  - 15.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 15.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 15.03 Develop a personal budget and financial goals. FL 3.1
  - 15.04 Complete financial instruments for making deposits and withdrawals. FL 3.2
  - 15.05 Maintain financial records. FL 3.3
  - 15.06 Read and reconcile financial statements. FL 3.4
  - 15.07 Research, compare and contrast investment opportunities.

**Course Number: ARR0313**  
**Occupational Completion Point: C**  
**Frame and Body Repairman – 150 Hours – SOC Code 49-3021**

- 01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:
  - 01.15 Perform structural damage analysis and determine repair procedures.
- 03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.08 Determine the extent of damage to structural body panels; repair, weld, or replace in accordance with manufacturers' specifications.
- 16.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 16.01 Describe the nature and types of business organizations. SY 1.0
  - 16.02 Explain the effect of key organizational systems on performance and quality.
  - 16.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 16.04 Explain the impact of the global economy on business organizations.
- 17.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 17.01 Employ leadership skills to accomplish organizational goals and objectives. LT 1.0
  - 17.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT 3.0
  - 17.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 17.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 18.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 18.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 18.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 18.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 18.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 18.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 18.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 18.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 18.08 Research the benefits of ongoing professional development. ECD 9.0
  - 18.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0
- 19.0 Setup Vehicle For Measuring And Pulling--The student will be able to:
- 19.01 Determine and plan methods and order of repair.
  - 19.02 Mount vehicle on anchoring equipment.
  - 19.03 Measure vehicle damage using manufacturers' specifications.
  - 19.04 Attach pulling equipment, pull and re-measure.
- 20.0 Inspect, Measure And Repair Unibody Vehicles--The student will be able to:
- 20.01 Precisely measure unibody vehicles.
  - 20.02 Diagnose and measure unibody damage using self-centering and tram gauges.
  - 20.03 Diagnose and measure unibody damage using a datum plane.
  - 20.04 Determine the location of all suspension, steering and power train component attaching point to the body.
  - 20.05 Clean, prime and apply protective coat to repaired unibody structural areas.

- 20.06 Determine the extent of the direct and indirect damage and the direction of impact and plan the method and order of repair.
  - 20.07 Precisely measure unibody vehicles, check and adjust suspension mount points that effect four-wheel alignment.
  - 20.08 Diagnose and measure unibody damage using a dedicated (fixture) measuring system.
  - 20.09 Diagnose and measure unibody damage using a universal measuring system or a laser.
  - 20.10 Attach proper body anchoring devices.
  - 20.11 Identify procedures to straighten and align cowl assemblies.
  - 20.12 Identify procedures to straighten and align roof pillars and roof panels.
  - 20.13 Identify procedures to straighten and align doorposts, sills, floor pans and rocker panels.
  - 20.14 Identify procedures to straighten and align quarter panels, wheel-housing assemblies and rear body sections (including rail, suspension and power train panels).
  - 20.15 Identify procedures to straighten/align front-end sections (aprons, strut towers, upper/lower rails, steering, suspension and power train mounting points).
  - 20.16 Recognize the limitations of applying heat to high strength steel structural components, use proper heat stress relief methods on high strength steel and weld in accordance with manufacturers' specifications.
  - 20.17 Use proper cold stress relief methods.
  - 20.18 Remove folds, curves, creases and dents using power tools and hand tools to restore damaged areas to proper contours and dimensions.
  - 20.19 Determine the extent of damage to structural steel body panels and repair, weld or replace them in accordance with manufacturers' specifications.
  - 20.20 Determine the extent of damage to structural aluminum body panels in accordance with manufacturers' specifications.
  - 20.21 Cut out damaged sections of structural steel body panels and weld in new and/or used replacement in accordance with accepted industry standards.
  - 20.22 Recheck panel contour and alignment after pulling and correct or adjust as necessary.
- 21.0 Inspect And Repair Frame Type Vehicle Bodies--The student will be able to:
- 21.01 Diagnose and measure frame damage using self-centering and tram gauge.
  - 21.02 Determine the extent of direct and indirect damage and the direction of impact and plan methods and order of repairs.
  - 21.03 Clean, prime and protective coat repaired frame areas.
  - 21.04 Identify procedures to straighten and align mash damage.
  - 21.05 Identify procedures to straighten and align sag damage.
  - 21.06 Identify procedures to straighten and align side sway damage.
  - 21.07 Identify procedures to straighten and align twist damage.
  - 21.08 Identify procedures to straighten and align kickup damage.
  - 21.09 Identify procedures to straighten and align broadside damage.
  - 21.10 Identify procedures to straighten and align diamond frame damage.
  - 21.11 Identify procedures to remove and replace damaged frame horns, side rails, cross members and front or rear frame sections and weld cracks in frame members.
  - 21.12 Repair, reinforce or replace weakened frame members in accordance with vehicle manufacturers' recommendations.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Collision Repair and Refinishing 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T400200
CIP Number	0647.060304
Grade Level	30, 31
Standard Length	650 hours
Teacher Certification	AUTO IND @7G AUTO BODY @7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3021
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: basic trade skills; refinishing skills; sheetmetal repair skills; frame and unibody squaring and aligning; use of fillers; paint systems and undercoats; related welding skills; related mechanical skills; trim-hardware maintenance; glass servicing; and other miscellaneous repairs. The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	ARR0127	Automotive Refinishing	325	49-3021
B	ARR0240	Automobile Body Repairer	325	49-3021

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment as automotive body, related repairers, automobile body repairers (SOC 49-3021).

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

The standard length of this program is 650 hours. **Automotive Collision Repair and Refinishing 1** is a core program. It is recommended students complete **Automotive Collision Repair and Refinishing 1**, or demonstrate mastery of the outcomes in that program, prior to enrollment in **Automotive Collision Repair and Refinishing 2**.

## Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## 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 program-specific OJT framework apply.



## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the

student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate vehicle and industry knowledge, business management, and shop and occupational safety skills.
- 02.0 Prepare vehicles for repair and refinishing.
- 03.0 Repair, replace and adjust outer body panels.
- 04.0 Perform welding operations.
- 05.0 Prepare surfaces for refinishing.
- 06.0 Select and apply appropriate paints and finishes.
- 07.0 Maintain and operate spray equipment.
- 08.0 Finish defects, causes and cures.
- 09.0 Prepare metal parts and panels for finishing.
- 10.0 Prepare and apply body fillers.
- 11.0 Perform miscellaneous repairs.
- 12.0 Repair fiberglass and plastic components.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Collision Repair and Refinishing 2**  
**PSAV Number: T400200**

**Course Number: ARR0127**  
**Occupational Completion Point: A**  
**Automotive Refinishing – 325 Hours – SOC Code 49-3021**

- 01.0 Demonstrate Vehicle And Industry Knowledge, Business Management And Shop And Occupational Safety Skills--The student will be able to:
- 01.01 Inspect air makeup and exhaust systems (including intake filters, exhaust filters, fans and other mechanical components of the system) to insure proper filtering and ventilation.
- 05.0 Prepare Surfaces For Refinishing--The student will be able to:
- 05.01 Inspect and identify type of substrate, and surface condition; develop a plan for refinishing.
  - 05.02 Chemically and mechanically remove paint finishes.
  - 05.03 Dry and wet sand areas to be refinished.
  - 05.04 Featheredge broken areas to be refinished.
  - 05.05 Determine when sealing is needed or desirable and apply suitable sealer to the area being refinished.
  - 05.06 Scuff sand to remove nibs or overspray from a sealer.
  - 05.07 Apply adhesion promoter over areas to be painted and blend into adjacent areas.
  - 05.08 Apply stone chip resistant coating.
  - 05.09 Restore corrosion resistant coatings, caulking and seam sealers to repaired areas.
- 06.0 Select And Apply Appropriate Paints And Finishes--The student will be able to:
- 06.01 Select the proper spray mask, inspect the spray mask to insure proper fit and operation, and inspect the condition of the mask filters and other components.
  - 06.02 Determine the type and color of paint already on a vehicle and identify alternates.
  - 06.03 Measure, shake, stir, thin or reduce, and strain paint.
  - 06.04 Verify color match before applying and adjust if needed.
  - 06.05 Apply acrylic enamel for spot, panel and overall refinishing.
  - 06.06 Apply urethane enamel for spot, panel and overall refinishing.
  - 06.07 Apply urethane clear coat for spot, panel and overall repairs.
  - 06.08 Apply decals, transfers, tapes, wood-grains, pinstripes (painted and taped), etc.
  - 06.09 Properly dispose of hazardous waste.
  - 06.10 Identify the types of plastic parts to be finished and determine the proper refinishing procedure.
  - 06.11 Apply a finish coat to plastic parts.
  - 06.12 Clean, condition and refinish vinyl (e.g. upholstery, dashes and tops).
  - 06.13 Apply a tri-coat paint system.

07.0 Maintain And Operate Spray Equipment--The student will be able to:

- 07.01 Explain, adjust and use a variety of spray guns including siphon feed, pressure feed, gravity feed and HVLP.
- 07.02 Check and adjust air pressure at the spray gun.
- 07.03 Adjust spray gun fluid and pattern control valves.
- 07.04 Use appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
- 07.05 Inspect, clean and determine the condition and adequacy of spray guns and related equipment (air hoses, regulators, airlines, air sources and spray environment).
- 07.06 Maintain and properly use the spray booth.

08.0 Finish Defects: Causes And Cures--The student will be able to:

- 08.01 Check for rust spots; determine the cause(s) and correct the condition.
- 08.02 Identify paint cracking (crowsfeet or line-checking, micro checking, etc); correct the condition.
- 08.03 Identify poor adhesion; determine the cause(s) and correct the condition.
- 08.04 Identify blistering appearance in the paint surface; determine the cause(s) and correct the condition.
- 08.05 Identify water spotting on paint surface, correct the condition.
- 08.06 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
- 08.07 Identify finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); correct the condition.
- 08.08 Identify die-back conditions (dulling of the paint film showing haziness and/or film distortion showing shrinking); correct the condition.
- 08.09 Identify chalking (oxidation); correct the condition.
- 08.10 Identify body filler bleed-through; correct the condition.
- 08.11 Identify pin holing; correct the condition.

**Course Number: ARR0240**

**Occupational Completion Point: B**

**Automobile Body Repairer – 325 Hours – SOC Code 49-3021**

02.0 Prepare Vehicles For Repair And Refinishing--The student will be able to:

- 02.01 Diagnose and analyze damage to determine appropriate methods for overall repair.
- 02.02 Locate, remove and replace to specifications, those vehicle electrical/electronic devices that might be damaged during repair.
- 02.03 Explain proper air bag operation and passive restraint handling.

03.0 Repair, Replace And Adjust Outer Body Panels--The student will be able to:

- 03.01 Remove, replace and align a welded (non-structural) steel panel or panel assembly.
- 03.02 Straighten roughed out contours of damaged panels to a surface condition for body filling or metal finishing.

- 03.03 Weld cracked or torn steel body panels; reweld broken welds.
- 03.04 Apply protective coatings and sealants to structural panels.
- 03.05 Heat shrink stretched panel areas back to contour.
- 03.06 Cold shrink stretched panel areas back to contour.
- 03.07 Repair or replace door skins and intrusion beams.

04.0 Perform Welding Operations--The student will be able to:

- 04.01 Identify metal types prior to welding.
- 04.02 Setup, operate and maintain metal inert gas (MIG) welding equipment.
- 04.03 Perform various welds with MIG equipment including plug, butt and lap.
- 04.04 Setup and maintain oxyacetylene welding equipment.
- 04.05 Explain various welding, cutting and heating techniques with oxyacetylene equipment.
- 04.06 Describe plasma cutting.
- 04.07 Remove, replace and align damaged, structural body panels and components that may interfere with or be damaged during repairing.
- 04.08 Identify procedures to Weld aluminum.
- 04.09 Explain electric compression spot welding.
- 04.10 Set up and perform plasma-cutting operations.

09.0 Prepare Metal Parts And Panels For Finishing--The student will be able to:

- 09.01 Identify specification(s) of metals used in automobiles.
- 09.02 Identify heat effects on metals.
- 09.03 Identify the importance of maintaining the structural integrity of an vehicle body.
- 09.04 Remove the paint from the damaged area of a body panel.
- 09.05 Pick and file the damaged area of a body panel to eliminate surface irregularities.
- 09.06 Disc sand the repaired body panel to produce final smoothness.

10.0 Prepare And Apply Body Fillers--The student will be able to:

- 10.01 Mix plastic filler.
- 10.02 Apply plastic body filler and cheese grate during curing.
- 10.03 Block sand cured plastic body fillers to contour and then finish sand.

11.0 Perform Miscellaneous Repairs--The student will be able to:

- 11.01 Align headlamps.
- 11.02 Apply rust repair methods including grinding, sandblasting and metal preparation.
- 11.03 Remove and replace headliners, carpets, seats and other interior components and trim.
- 11.04 Inspect, repair or replace weather stripping.
- 11.05 Identify procedures to perform two- and four- wheel alignments.
- 11.06 Diagnose and repair water leaks, dust leaks and wind noises.
- 11.07 Identify procedures to remove and replace all stationary glass (including windshield, back lights, etc.) using manufacturers' recommended installation materials and procedures including electrically heated glass.
- 11.08 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanism and related controls.
- 11.09 Repair/replace all power driven accessories and related controls.

- 11.10 Inspect, repair or replace and adjust removable manually operated or electrically operated roof panels, hinges, latches, guides, handles, retainers and controls of sunroof.
  - 11.11 Diagnose and repair damaged circuits, wires and electrical components.
  - 11.12 Remove, replace and cap off air conditioner components.
  - 11.13 Evacuate, recycle and recharge air conditioning systems.
  - 11.14 Identify procedures to remove and replace engines and mounts.
  - 11.15 Identify procedures to remove and replace transmissions and mounts.
  - 11.16 Identify procedures to remove and replace suspension parts.
  - 11.17 Identify procedures to remove and replace brake parts.
  - 11.18 Identify procedures to bleed brakes.
  - 11.19 Identify procedures to remove and replace fuel system components.
  - 11.20 Demonstrate an understanding of ABS braking systems.
  - 11.21 Inspect, adjust or repair steering, suspension and power-train components that affect four-wheel alignment.
- 12.0 Repair Fiberglass And Plastic Components--The student will be able to:
- 12.01 Differentiate between fiberglass and sheet molded compound (SMC) to be repaired and the appropriate repair procedures (including plastic welding, chemical bonding and the use of structural adhesives).
  - 12.02 Repair deep gouges and cracks in fiberglass panels and sheet molded compound (SMC).
  - 12.03 Repair holes in fiberglass panels and SMC.
  - 12.04 Repair fiberglass body panels and straighten/align panel supports.
  - 12.05 Remove damaged areas from fiberglass panels and SMC and repair with partial panel installation.
  - 12.06 Prepare the surfaces of and repair damage to, thermoplastic parts.
  - 12.07 Prepare the surfaces of and repair damage to thermosetting-plastic parts.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Service Technology 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T400700
CIP Number	0647.060411
Grade Level	30, 31
Standard Length	1050 Hours
Teacher Certification	AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 9.0 Reading: 9.0

### **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 planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### **Program Structure**

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

**NOTE: The sequence of OCP's after completing the core OCP A is at the discretion of the instructor. It should be noted that NATEF requires a minimum certification in four occupational areas (Brakes, Electrical/Electronics, Engine Performance and Suspension/Steering) for program certification. Florida Statute (F.S.) 1004.925 requires Automotive Service Technology programs to be industry certified by 2007.**

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0014	Automobile Services Assistor	300	49-3023
B	AER0418	Automotive Brake System Technician	150	49-3023
C	AER0453	Automobile Suspension and Steering Technician	150	49-3023
D	AER0360	Automotive Electrical/Electronic System Technician	300	49-3023
E	AER0110	Engine Repair Technician	150	49-3023

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for employment and/or specialized training in the automotive industry.

Competencies established by the Automotive Industries for "INDUSTRY TRAINING STANDARDS" plus integration of academic requirements and training in communications, leadership, human relations, employability skills, safe, efficient work practices and entrepreneurship account for 300 hours in the CORE curriculum (OCPA).

All the tasks that are assigned a priority number: P-1, P-2, or P-3 are National Automotive Technician Education Foundation Tasks. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the Policies section for additional information on the requirements for instruction on tasks.



Theory instruction and hands-on performance of all the basic tasks will provide initial training for employment in the automotive service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

1. It is assumed that:

- \* In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
- \* The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
- \* The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.

2. It is assumed that:

- \* All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published.
- \* For every task listed, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of hazardous materials in accordance with local, state, and federal safety and environmental regulations.

3. It is assumed that:

- \* Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
- \* Learning progress of students will be monitored and evaluated against these performance standards;
- \* A system is in place, which informs all students of their individual progress through all phases of the training program.

4. It is assumed that:

- \* Individual courses of study will differ across automobile technician training programs;
- \* Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.

5. It is assumed that:

- \* All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law".
- \* Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry.
- 02.0 Demonstrate proficiency in routine maintenance and consumer services.
- 03.0 Demonstrate proficiency in the operation and servicing of automotive brake systems.
- 04.0 Demonstrate proficiency in drum brake diagnosis and repair.
- 05.0 Demonstrate proficiency in the operation of disc brake diagnosis and repair.
- 06.0 Demonstrate proficiency in the operation of power assist units diagnosis and repair.
- 07.0 Demonstrate proficiency in miscellaneous (wheel bearings, parking brakes, electrical, etc.)
- 08.0 Demonstrate proficiency in antilock brake system.
- 09.0 Demonstrate proficiency in general suspension and steering systems diagnosis.
- 10.0 Demonstrate proficiency in suspension systems diagnosis and repair; front suspensions.

- 11.0 Demonstrate proficiency in suspension systems diagnosis and repair; rear suspensions, wheel alignment diagnosis, adjustment, repair and miscellaneous service.
- 12.0 Demonstrate proficiency in wheel and tire diagnosis and repair.
- 13.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train.
- 14.0 Demonstrate proficiency in battery diagnosis and service.
- 15.0 Demonstrate proficiency in starting system diagnosis and repair.
- 16.0 Demonstrate proficiency in charging system diagnosis and repair
- 17.0 Demonstrate proficiency in lighting systems, gauges, warning devices, and driver information systems diagnosis and repair
- 18.0 Demonstrate proficiency in horn and wiper/washer and accessories diagnosis and repair
- 19.0 Demonstrate proficiency in appropriate math skills.
- 20.0 Demonstrate proficiency in appropriate understanding of basic sciences.
- 21.0 Demonstrate proficiency in employability skills.
- 22.0 Demonstrate proficiency in appropriate communication skills.
- 23.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry.
- 24.0 Demonstrate proficiency in understanding of entrepreneurship.
- 25.0 Demonstrate proficiency in general engine diagnosis.
- 26.0 Demonstrate proficiency in cylinder head and valve train diagnosis and repair.
- 27.0 Demonstrate proficiency in engine block diagnosis and repair.
- 28.0 Demonstrate proficiency in lubrication and cooling systems diagnosis and repairs.
- 29.0 Demonstrate language arts knowledge and skills
- 30.0 Solve problems using critical thinking skills, creativity and innovation.
- 31.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Service Technology 1**  
**PSAV Number: T400700**

**Course Number: AER0014**  
**Occupational Completion Point: A**  
**Automobile Services Assistor – 300 Hours – SOC Code 49-3023**

01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry--The student will be able to:

- 01.01 Apply shop safety rules, EPA and OSHA standards.
- 01.02 Identify and use appropriate emergency first aid procedures
- 01.03 Identify, use and maintain hand and power tools properly.
- 01.04 Identify and practice using appropriate precision-measuring tools and torque methods.
- 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.
- 01.06 Identify and use Metric and English measurement skills.
- 01.07 Use computer and operate keyboard.
- 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
- 01.09 Identify and describe typical automotive lubricants and lubricant properties.
- 01.10 Interpret the Federal 'Workers Right To Know Law'.
- 01.11 Identify and describe typical automotive seals and gaskets.
- 01.12 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
- 01.13 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
- 01.14 Describe and identify supplemental restraint systems (SRS).
- 01.15 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

02.0 Demonstrate proficiency in the proficiency in routine maintenance and consumer services AKA light line AKA general service technician--The student will be able to:

- 02.01 Inspect, test headlamps, tail lamps and stop lamps. Aim headlights.
- 02.02 Perform oil and filter change including lubricating suspension and steering systems.
- 02.03 Service transmission; perform visual inspection; replace fluids and filters.
- 02.04 Inspect engine assembly for fuel, oil, coolant, and other leaks.
- 02.05 Inspect manual and power steering fluid levels and condition.
- 02.06 Check rear axle drive assembly seals and vents; check lube level.
- 02.07 Remove, inspect, and service front and rear wheel bearings on non-drive axles.
- 02.08 Inspect tires and diagnose tire wear patterns. Check and adjust air pressure.
- 02.09 Rotate tires according to manufacturer's recommendations, install wheels, torque lug nuts.
- 02.10 Balance wheel and tire assembly (static and dynamic).

- 02.11 Dismount, inspect, repair, and remount tire on wheel.
- 02.12 Check master cylinder for internal and external leaks and proper operation.
- 02.13 0Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
- 02.14 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
- 02.15 Select, handle, store, and install brake fluids to proper level.
- 02.16 Fill master cylinder with recommended fluid and seat pads.
- 02.17 Inspect, clean, fill, and replace battery.
- 02.18 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or perform necessary action.
- 02.19 Start a vehicle using jumper cables using a battery auxiliary power supply.
- 02.20 Perform slow/fast battery charge.
- 02.21 Observe dash warning lamps during bulb check.
- 02.22 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).
- 02.23 Practice recommended precautions when handling static sensitive devices.
- 02.24 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or perform necessary action.
- 02.25 Inspect, replace, and adjust drive belts and pulleys.
- 02.26 Inspect and replace engine cooling and heater system hoses.
- 02.27 Inspect, test, and replace thermostat and housing.
- 02.28 Perform cooling system pressure tests; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or perform necessary action.
- 02.29 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or perform necessary action.
- 02.30 Determine coolant condition; drain, flush, recover and refill cooling system with recommended coolant and bleed air as required.
- 02.31 Inspect, test, remove, and replace water pump.
- 02.32 Check parking brake operation; adjust as needed.
- 02.33 Use wiring diagrams to diagnose electrical circuit problems.
- 02.34 Check electrical circuits with a test light; determine necessary action.
- 02.35 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).
- 02.36 Check current flow in electrical/electronic circuits and components using an ammeter.
- 02.37 Check electrical circuits using a fused jumper wire.
- 02.38 Measure and diagnose the cause(s) of abnormal key-off battery drain.
- 02.39 Inspect and test fusible links, circuit breakers, and fuses; perform necessary action.
- 02.40 Perform battery capacity (load, high-rate discharge) test; determine necessary service.
- 02.41 Maintain or restore electronic memory functions.
- 02.42 Perform starter current draw and circuit voltage drop test; determine necessary action.
- 02.43 Remove and replace/reinstall starter.
- 02.44 Perform charging system test.
- 02.45 Remove, inspect, and replace/reinstall alternator.
- 02.46 Demonstrate retrieving stored diagnostic trouble codes using a scan tool.
- 02.47 Obtain and interpret digital multimeter (DMM) readings.
- 02.48 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.

- 02.49 Replace a fuel filter.
- 02.50 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or perform necessary action.
- 02.51 Adjust valves on engines with mechanical lifters.
- 02.52 Remove and replace valve cover gaskets.
- 02.53 Inspect passenger restraint system, repair if needed.

19.0 Demonstrate proficiency in appropriate math skills--The student will be able to:

- 19.01 Read and interpret measuring devices (rules and tapes)
- 19.02 Solve number word problems.
- 19.03 Write percents add fractions and decimals.
- 19.04 Solve percent problems.
- 19.05 Find the percent of a number.
- 19.06 Operate a calculator.
- 19.07 Understand and use the metric system.
- 19.08 Convert inches to millimeters and millimeters to inches.
- 19.09 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
- 19.10 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- 19.11 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 19.12 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 19.13 Understand and interpret gears and gear ratios.

20.0 Demonstrate proficiency in appropriate understanding of basic sciences--The student will be able to:

- 20.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 20.02 Draw conclusions or make inferences from data.
- 20.03 Related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
- 20.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

21.0 Demonstrate proficiency in employability skills--The student will be able to:

- 21.01 Identify employment requirements for an automotive career.
- 21.02 Identify documents which may be required when applying for a job.
- 21.03 Complete a job application form correctly.
- 21.04 Identify and adopt acceptable work habits.
- 21.05 Demonstrate acceptable employee health habits; including infection control of blood born pathogens.
- 21.06 Demonstrate appropriate telephone/communication skills.
- 21.07 Conduct a job search.
- 21.08 Demonstrate competence in job interview techniques.

- 21.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
- 21.10 Demonstrate knowledge of how to make job changes appropriately.
- 22.0 Demonstrate proficiency in appropriate communication skills--The student will be able to:
  - 22.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
  - 22.02 Read and follow written and oral instructions..
  - 22.03 Answer and ask questions coherently and concisely.
  - 22.04 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 23.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry--The student will be able to:
  - 23.01 Explain the effects of chemical/substance abuse.
  - 23.02 Identify principles of stress management.
  - 23.03 Identify and define career opportunities in the automotive service industry.
  - 23.04 Demonstrate acceptable industry dress code.
  - 23.05 Identify and demonstrate proper customer relation skills.
  - 23.06 Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
  - 23.07 Identify principles of time management.
  - 23.08 Identify acceptable customer relations.
- 24.0 Demonstrate proficiency in understanding of entrepreneurship--The student will be able to:
  - 24.01 Define entrepreneurship.
  - 24.02 Describe the importance of entrepreneurship to the American economy.
  - 24.03 List the advantages and disadvantages of business ownership.
  - 24.04 Identify the risks involved in ownership of business.
  - 24.05 Identify the necessary personal characteristics of a successful entrepreneur.
  - 24.06 Identify the business skills needed to operate a small business efficiently and effectively.
  - 24.07 Identify and apply communication skills used in automotive careers.

**Course Number: AER0418**

**Occupational Completion Point: B**

**Automotive Brake System Technician – 150 Hours – SOC Code 49-3023**

- 03.0 Demonstrate proficiency in general brake system diagnosis and hydraulic system diagnosis and repair--The student will be able to:
  - 03.01 Identify and interpret brake system concern; determine necessary action.
  - 03.02 Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.



- 03.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).
  - 03.04 Diagnose pressure concerns in the brake system using hydraulic principles (Paschal's Law).
  - 03.05 Measure brake pedal height; determine necessary action.
  - 03.06 Check master cylinder for internal and external leaks and proper operation; determine necessary action.
  - 03.07 Remove, bench bleed, and reinstall master cylinder.
  - 03.08 Diagnose poor stopping, pulling or dragging concerns caused by problems in the hydraulic system; determine necessary
  - 03.09 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.
  - 03.10 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.
  - 03.11 Select, handle, store, and install brake fluids to proper level.
  - 03.12 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.
  - 03.13 Inspect, test, replace, and adjust height (load) sensing proportioning valve.
  - 03.14 Inspect, test, and replace components of brake warning light
  - 03.15 Bleed (manual, pressure, vacuum or surge) brake system
  - 03.16 Flush hydraulic system.
- 04.0 Demonstrate proficiency in drum brake diagnosis and repair --The student will be able to:
- 04.01 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.
  - 04.02 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or perform necessary action.
  - 04.03 Refinish Brake Drum.
  - 04.04 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
  - 04.05 Remove and inspect wheel cylinders.
  - 04.06 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
  - 04.07 Install wheel, torque lug nuts, and make final checks and adjustments
- 05.0 Demonstrate proficiency in the operation of disc brake diagnosis and repair--The student will be able to:
- 05.01 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.
  - 05.02 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.
  - 05.03 Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.
  - 05.04 Remove, clean, and inspect pads and retaining hardware; determine necessary action.

- 05.05 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.
  - 05.06 Reassemble, lubricate, and reinstall caliper, pads, and related hardware, seat pads, and inspect for leaks.
  - 05.07 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.
  - 05.08 Remove and replace rotor.
  - 05.09 Refinish rotor according to manufacturer's recommendations.
  - 05.10 Adjust calipers with integrated parking brake system.
  - 05.11 Install wheel, torque lug nuts, and make final checks and adjustments.
- 06.0 Demonstrate proficiency in the operation of power assist units diagnosis and repair--The student will be able to:
- 06.01 Test pedal free travel with and without engine running; check
  - 06.02 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
  - 06.03 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.
  - 06.04 Inspect and test hydro-boost system and accumulator for leaks and proper operation; determine necessary action.
- 07.0 Demonstrate proficiency in miscellaneous (wheel bearings, parking brakes, electrical, etc.) diagnosis and repair--The student will be able to:
- 07.01 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
  - 07.02 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings.
  - 07.03 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed.
  - 07.04 Check parking brake operation; adjust as needed.
  - 07.05 Check operation of parking brake indicator light system.
  - 07.06 Check operation of brake stop light system; determine necessary action.
  - 07.07 Replace wheel bearing and race.
  - 07.08 Inspect and replace wheel studs.
  - 07.09 Remove and reinstall sealed wheel bearing assembly.
- 08.0 Demonstrate proficiency in antilock brake system --The student will be able to:
- 08.01 Inspect, and test antilock brake system (ABS) components; determine necessary action.
  - 08.02 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the antilock brake system (ABS); determine necessary action.
  - 08.03 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.
  - 08.04 Depressurize high pressure components of the antilock brake system (ABS) following manufacturer's recommended safety procedures.

- 08.05 Bleed the antilock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures.
  - 08.06 Remove and install antilock brake system (ABS) electrical/electronic/ hydraulic components.
  - 08.07 Test, diagnose and service ABS speed sensors, toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).
  - 08.08 Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc).
  - 08.09 Identify traction control system components.
- 29.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 29.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
  - 29.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 29.03 Present information formally and informally for specific purposes and audiences.AF2.9

**Course Number: AER0453**

**Occupational Completion Point: C**

**Automobile Suspension and Steering Technician – 150 Hours – SOC Code 49-3023**

- 09.0 Demonstrate proficiency in general suspension and steering system diagnosis--The student will be able to:
- 09.01 Identify and interpret suspension and steering concern; determine necessary action.
  - 09.02 Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins.
  - 09.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).
  - 09.04 Disable and enable supplemental restraint system (SRS)
  - 09.05 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
  - 09.06 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action
  - 09.07 Diagnose power steering (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action.
  - 09.08 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering and fluid leakage concerns; determine necessary action.
  - 09.09 Inspect steering shaft universal-joint(s), flexible coupling (s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.
  - 09.10 Adjust manual or power non-rack and pinion worm bearing preload and sector lash.
  - 09.11 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.
  - 09.12 Adjust manual or power rack and pinion steering gear.

- 09.13 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
  - 09.14 Inspect power steering fluid levels and condition.
  - 09.15 Flush, fill, and bleed power steering system.
  - 09.16 Diagnose power steering fluid leakage; determine necessary action.
  - 09.17 Remove and reinstall replace, and adjust power steering pump belt.
  - 09.18 Remove and reinstall power steering pump.
  - 09.19 Remove and reinstall power steering pump pulley; check pulley and belt alignment.
  - 09.20 Inspect and replace power steering hoses and fittings.
  - 09.21 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
  - 09.22 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
  - 09.23 Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action.
- 10.0 Demonstrate proficiency in suspension systems diagnosis and repair; front suspensions  
--The student will be able to:
- 10.01 Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action.
  - 10.02 Diagnose strut suspension system noises body sway, and uneven riding height concerns; determine necessary action.
  - 10.03 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers.
  - 10.04 Remove, inspect, install, and adjust strut rods (compression/tension) and bushings.
  - 10.05 Remove, inspect, and install upper and lower ball joints.
  - 10.06 Remove, inspect, and install steering knuckle assemblies.
  - 10.07 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.
  - 10.08 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts.
  - 10.09 Remove, inspect and install stabilizer bar bushings, bracket and links.
  - 10.10 Remove, inspect, and replace strut cartridge or assembly, strut coil spring, (silencers) insulators, and upper strut bearing mount.
  - 10.11 Lubricate suspension and steering systems.
- 11.0 Demonstrate proficiency in suspension systems diagnosis and repair; rear suspensions, wheel alignment diagnosis, adjustment, repair and miscellaneous service --The student will be able to:
- 11.01 Remove, inspect, and install coil springs and spring insulators.
  - 11.02 Remove, inspect, and install transverse links, control arms, bushings, and mounts.
  - 11.03 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
  - 11.04 Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers).
  - 11.05 Inspect, remove, and replace shock absorbers.
  - 11.06 Remove, inspect, and service or replace front and rear wheel bearings.

- 11.07 Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action.
  - 11.08 Differentiate between steering and suspension concerns using principles of steering geometry (caster, camber, toe, etc).
  - 11.09 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
  - 11.10 Perform pre-alignment inspection; perform necessary action.
  - 11.11 Measure vehicle riding height; determine necessary action.
  - 11.12 Check and adjust front and rear wheel camber; perform necessary action.
  - 11.13 Check and adjust caster; perform necessary action.
  - 11.14 Check and adjust front wheel toe; adjust as needed.
  - 11.15 Center steering wheel.
  - 11.16 Check toe-out-on-turns (turning radius); determine necessary action.
  - 11.17 Check SAI (steering axis inclination) and included angle; determine necessary action.
  - 11.18 Check and adjust rear wheel toe.
  - 11.19 Check rear wheel thrust angle; determine necessary action.
  - 11.20 Check for front wheel setback; determine necessary action.
  - 11.21 Check front cradle (sub-frame) alignment; determine necessary action.
- 12.0 Demonstrate proficiency in wheel and tire diagnosis and repair --The student will be able to:
- 12.01 Diagnose tire wear patterns; determine necessary action.
  - 12.02 Inspect tires; check and adjust air pressure.
  - 12.03 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
  - 12.04 Rotate tires according to manufacturer's recommendations.
  - 12.05 Measure wheel, tire, axle, and hub run out; determine necessary action.
  - 12.06 Diagnose tire pull (lead) problem; determine necessary action.
  - 12.07 Balance wheel and tire assembly (static and dynamic)
  - 12.08 Dismount, inspect, repair, and remount tire on wheel.
  - 12.09 Reinstall wheel; torque lug nuts.
  - 12.10 Inspect and repair tire.
- 30.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 30.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 30.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 30.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 30.04 Conduct technical research to gather information necessary for decision-making.PS 4.0

**Course Number: AER0360**

**Occupational Completion Point: D**

**Automotive Electrical/Electronic System Technician – 150 Hours – SOC Code 49-3023**

- 13.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components related to power train--The student will be able to:

- 13.01 Identify and interpret electrical/electronic system concern; determine necessary action.
  - 13.02 Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.
  - 13.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
  - 13.04 Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).
  - 13.05 Use wiring diagrams during diagnosis of electrical circuit problems.
  - 13.06 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.
  - 13.07 Check electrical circuits with a test light; determine necessary action.
  - 13.08 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine necessary action.
  - 13.09 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
  - 13.10 Check continuity and resistance(s) in electrical/electronic circuits and components with an ohmmeter; determine necessary action.
  - 13.11 Check electrical circuits using fused jumper wires; determine necessary action.
  - 13.12 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
  - 13.13 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
  - 13.14 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
  - 13.15 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or perform necessary action.
  - 13.16 Repair wiring harnesses and connectors.
  - 13.17 Perform solder repair of electrical wiring.
- 14.0 Demonstrate proficiency in battery diagnosis and service --The student will be able to:
- 14.01 Perform battery state-of-charge test; determine needed service.
  - 14.02 Perform battery capacity test; conform proper battery capacity for vehicle determine necessary action.
  - 14.03 Maintain or restore electronic memory functions.
  - 14.04 Inspect, clean, fill, and replace battery.
  - 14.05 Perform slow/fast battery charge.
  - 14.06 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
  - 14.07 Start a vehicle using jumper cables and a battery or auxiliary power supply.
- 15.0 Demonstrate proficiency in starting system diagnosis and repair--The student will be able to:
- 15.01 Perform starter current draw tests. Determine necessary action.
  - 15.02 Perform starter circuit voltage drop tests; determine necessary action.
  - 15.03 Inspect and test starter relays and solenoids; determine necessary action.
  - 15.04 Remove and install starter in a vehicle.

- 15.05 Inspect, and test switches, connectors, and wires of starter control circuits; perform necessary action.
- 15.06 Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.
  
- 16.0 Demonstrate proficiency in charging system diagnosis and repair--The student will be able to:
  - 16.01 Perform charging system output test; determine necessary action.
  - 16.02 Diagnose charging system for the cause of undercharge, no charge, and overcharge conditions.
  - 16.03 Inspect and adjust generator (alternator) drive belts, pulleys and tensioners; check pulley and belt alignment.
  - 16.04 Inspect and test voltage regulator/regulating circuit; perform necessary action.
  - 16.05 Remove, inspect, and install generator (alternator).
  - 16.06 Perform charging circuit voltage drop tests; determine necessary action.
  
- 17.0 Demonstrate proficiency in lighting systems, gauges, warning devices, and driver information systems diagnosis and repair --The student will be able to:
  - 17.01 Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action.
  - 17.02 Inspect, replace, and aim headlights and bulbs.
  - 17.03 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.
  - 17.04 Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action.
  - 17.05 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or determine necessary action.
  - 17.06 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.
  - 17.07 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; determine necessary action.
  
- 18.0 Demonstrate proficiency in horn and wiper/washer and accessories diagnosis and repair --The student will be able to:
  - 18.01 Diagnose incorrect horn operation; perform necessary action.
  - 18.02 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.
  - 18.03 Diagnose incorrect washer operation; perform necessary action.
  - 18.04 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.
  - 18.05 Diagnose incorrect heated glass operation; determine necessary action.
  - 18.06 Diagnose incorrect electric lock operation; determine necessary action.
  - 18.07 Diagnose incorrect operation of cruise control systems; determine necessary action.
  - 18.08 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment).

- 18.09 Diagnose radio static and weak, intermittent, or no radio reception, determine necessary action.
  - 18.10 Disarm and enable the airbag system for vehicle service.
  - 18.11 Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.
  - 18.12 Remove and reinstall door panel.
  - 18.13 Diagnose body electronic system circuits using a scan tool; determine necessary action.
  - 18.14 Check for module communication errors using a scan tool.
  - 18.15 Diagnose the cause of false, intermittent, or no operation of anti-theft system.
- 31.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 31.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 31.02 Explain emergency procedures to follow in response to workplace accidents.
  - 31.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: AER0110****Occupational Completion Point: E****Engine Repair Technician – 150 Hours – SOC Code 49-3023**

- 25.0 Demonstrate proficiency in general engine diagnosis --The student will be able to:
- 25.01 Identify and interpret engine concern; determine necessary action.
  - 25.02 Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.
  - 25.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
  - 25.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
  - 25.05 Diagnose engine noises and vibrations; determine necessary action.
  - 25.06 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.
  - 25.07 Perform engine vacuum tests; determine necessary action.
  - 25.08 Perform cylinder power balance tests; determine necessary action.
  - 25.09 Perform cylinder compression tests; determine necessary action.
  - 25.10 Perform cylinder leakage tests; determine necessary action.
  - 25.11 Remove and reinstall engine in a late model front-wheel drive vehicle (**OBDI** or newer); reconnect all attaching components and restore the vehicle to running condition.
  - 25.12 Remove and reinstall engine in a late model rear-wheel drive vehicle (**OBDI** or newer); reconnect all attaching components and restore the vehicle to running condition.
- 26.0 Demonstrate proficiency in cylinder head and valve train diagnosis and repair --The student will be able to:



- 26.01 Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.
  - 26.02 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.
  - 26.03 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed.
  - 26.04 Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks, and valve grooves; determine necessary action.
  - 26.05 Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.
  - 26.06 Inspect valves and valve seats; determine necessary action.
  - 26.07 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed.
  - 26.08 Check valve spring assembled height and valve stem height; determine necessary action.
  - 26.09 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.
  - 26.10 Inspect hydraulic or mechanical lifters; determine necessary action.
  - 26.11 Adjust valves (mechanical or hydraulic lifters).
  - 26.12 Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear;) determine necessary action.
  - 26.13 Inspect and replace timing belt(s), overhead camdrive sprockets and tensioners; check belt tension; adjust as necessary.
  - 26.14 Inspect camshaft for run out; journal wear and lobe wear.
  - 26.15 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
  - 26.16 Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures.
- 27.0 Demonstrate proficiency in engine block diagnosis and repair --The student will be able to:
- 27.01 Disassemble engine block; clean and prepare components for inspection and reassembly.
  - 27.02 Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.
  - 27.03 Inspect internal and external threads; restore as needed (includes installing thread inserts).
  - 27.04 Inspect and measure cylinder walls for damage, wear, and ridges; determine necessary action.
  - 27.05 Inspect and measure cylinder walls for damage and wear; determine necessary action.
  - 27.06 Deglaze and clean cylinder walls.
  - 27.07 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
  - 27.08 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings).

- 27.09 Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition.
  - 27.10 Inspect and measure pistons; determine necessary action.
  - 27.11 Remove and replace piston pin.
  - 27.12 Inspect, measure, and install piston rings.
  - 27.13 Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.
  - 27.14 Inspect, repair or replace crankshaft vibration damper (harmonic balancer).
  - 27.15 Assemble the engine using gaskets, seals, and formed-in-place (tube-applied) sealants, thread sealers, etc. according to manufacturer's specifications.
  - 27.16 Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action.
- 28.0 Demonstrate proficiency in lubrication and cooling systems diagnosis and repairs --The student will be able to:
- 28.01 Perform oil pressure tests; determine necessary action.
  - 28.02 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.
  - 28.03 Perform cooling system, cap and recovery tests (pressure, combustion leakage, and temperature); determine necessary action.
  - 28.04 Inspect, replace, and adjust drive belts, tensioners and pulleys.
  - 28.05 Inspect and replace engine cooling and heater system hoses.
  - 28.06 Inspect, test, and replace thermostat and housing.
  - 28.07 Test coolant; drain and recover, flush, and refill cooling system with recommended coolant and bleed air as required.
  - 28.08 Inspect, test, remove, and replace water pump.
  - 28.09 Remove and replace radiator.
  - 28.10 Inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
  - 28.11 Inspect auxiliary oil coolers; perform necessary action.
  - 28.12 Inspect, test, and replace oil temperature and pressure switches and sensors.
  - 28.13 Perform oil and filter change.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Automotive Service Technology 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T400800
CIP Number	0647.060412
Grade Level	30, 31
Standard Length	750 Hours
Teacher Certification	AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 9.0 Reading: 9.0

### 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 planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### Program Structure

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

**NOTE: The sequence of OCP's is at the discretion of the instructor. It should be noted that NATEF requires a minimum certification in four occupational areas (Brakes, Electrical/Electronics, Engine Performance and Suspension/Steering) for program certification. Florida Statute (F.S.) 1004.925 requires Automotive Service Technology programs to be industry certified by 2007.**

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0503	Automotive Engine Performance Technician	300	49-3023
B	AER0257	Automatic Transmission and Transaxle Technician	150	49-3023
C	AER0274	Manual Drivetrain and Axle Technician	150	49-3023
D	AER0172	Automotive Heating and Air Conditioning Technician	150	49-3023

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for employment and/or specialized training in the automotive industry.

Competencies established by the Automotive Industries for "INDUSTRY TRAINING STANDARDS" plus integration of academic requirements and training in communications, leadership, human relations, employability skills, safe, efficient work practices and entrepreneurship account for 300 hours in the CORE curriculum (OCP A of Automotive Service Technology 1).

All the tasks that are assigned a priority number: P-1, P-2, or P-3 are National Automotive Technician Education Foundation Tasks. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the Policies section for additional information on the requirements for instruction on tasks.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for employment in the automotive service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

1. It is assumed that:

- \* In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
- \* The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
- \* The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.

2. It is assumed that:

- \* All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published.
- \* For every task listed, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of hazardous materials in accordance with local, state, and federal safety and environmental regulations.

3. It is assumed that:

- \* Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
- \* Learning progress of students will be monitored and evaluated against these performance standards;
- \* A system is in place, which informs all students of their individual progress through all phases of the training program.

4. It is assumed that:

- \* Individual courses of study will differ across automobile technician training programs;
- \* Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.

5. It is assumed that:

- \* All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law".
- \* Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

The standard length of this program is 750 hours. **Automotive Service Technology 1** is a core program. It is recommended students complete **Automotive Service Technology 1**, or demonstrate mastery of the outcomes in that program, prior to enrollment in **Automotive Service Technology 2**.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in general engine diagnosis.
- 02.0 Demonstrate proficiency in computerized engine controls diagnosis and repair.
- 03.0 Demonstrate proficiency in ignition system diagnosis and repair.
- 04.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair.
- 05.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair.
- 06.0 Demonstrate proficiency in intake air temperature controls, early fuel evaporation (intake manifold temperature) controls and evaporative emissions controls.

- 07.0 Demonstrate proficiency in engine related service.
- 08.0 Use information technology tools
- 09.0 Demonstrate personal money-management concepts, procedures, and strategies
- 10.0 Demonstrate proficiency in A/C system diagnosis and repair.
- 11.0 Demonstrate proficiency in refrigeration system component diagnosis and repair of compressor, compressor clutch, evaporator, receiver/drier, condenser, etc.
- 12.0 Demonstrate proficiency in heating and engine cooling systems diagnosis and repair
- 13.0 Demonstrate proficiency in A/C operating systems and related controls diagnosis and repairs
- 14.0 Demonstrate proficiency refrigerant recovery, recycling, and handling
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 16.0 Demonstrate proficiency in general drive train diagnosis, clutch diagnosis and repair.
- 17.0 Demonstrate proficiency in transmission & transaxle diagnosis and repair.
- 18.0 Demonstrate proficiency in drive and half shaft universal and constant-velocity (CV) joint diagnosis and repair.
- 19.0 Demonstrate proficiency in rear axle diagnosis and repair; ring and pinion gears, differential case assembly and limited slip differential.
- 20.0 Demonstrate proficiency in drive axle shaft and four-wheel drive/all-wheel drive component diagnosis and repair.
- 21.0 Describe the importance of professional ethics and legal responsibilities.
- 22.0 Demonstrate proficiency in the operation and servicing of automatic transmission/transaxle.
- 23.0 Demonstrate proficiency in transmission/transaxle maintenance, adjustment and in-vehicle transmission/transaxle repair.
- 24.0 Demonstrate proficiency in off-vehicle transmission/transaxle repair (removal, disassembly, and reinstallation), oil pump and converter.
- 25.0 Demonstrate proficiency in gear train, shafts, bushings, case, friction units and reaction units.
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Automotive Service Technology 2**  
**PSAV Number: T400800**

**Course Number: AER0503**  
**Occupational Completion Point: A**  
**Automotive Engine Performance Technician – 300 Hours – SOC Code 49-3023**

01.0 Demonstrate proficiency in general engine diagnosis--The student will be able to:

- 01.01 Identify and interpret engine performance concerns; determine necessary action.
- 01.02 Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.
- 01.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
- 01.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 01.05 Diagnose unusual engine noise or vibration concerns; determine necessary action.
- 01.06 Diagnose unusual exhaust color, odor, and sound; determine necessary action.
- 01.07 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- 01.08 Perform cylinder power balance test; determine necessary action.
- 01.09 Perform cylinder compression test; determine necessary action.
- 01.10 Perform cylinder leakage test; determine necessary action.
- 01.11 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action.
- 01.12 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine necessary action.
- 01.13 Verify engine operating temperature; determine necessary action.
- 01.14 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.
- 01.15 Verify correct camshaft timing.

02.0 Demonstrate proficiency in computerized engine controls diagnosis and repair –The student will be able to:

- 02.01 Retrieve and record stored OBD I diagnostic trouble codes; clear codes.
- 02.02 Retrieve and record stored OBDII diagnostic trouble codes; clear codes.
- 02.03 Diagnose the causes of emissions or driveability concerns resulting from failure of computerized engine controls with stored diagnostic trouble codes.
- 02.04 20.04 Diagnose emissions or driveability concerns resulting from failure of computerized engine controls with no stored diagnostic trouble codes determine necessary action.
- 02.05 20.05 Check for module communication errors using a scan tool.

- 02.06 20.06 Inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action.
  - 02.07 20.07 Obtain and interpret scan tool data.
  - 02.08 20.08 Access and use service information to perform step-by-step diagnosis. (ESI).
  - 02.09 Diagnose driveability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action.
- 03.0 Demonstrate proficiency in ignition system diagnosis and repair --The student will be able to:
- 03.01 Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action.
  - 03.02 Inspect and test ignition primary circuit wiring and components; perform necessary action.
  - 03.03 Inspect and test distributor; perform necessary action.
  - 03.04 Inspect and test ignition system secondary circuit wiring and components; perform necessary action.
  - 03.05 Inspect and test ignition coil(s); perform necessary action.
  - 03.06 Check and adjust ignition system timing and timing advance/retard (where applicable).
  - 03.07 Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action.
- 04.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair --The student will be able to:
- 04.01 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine necessary action.
  - 04.02 Diagnose hot or cold no-starting, hard starting, poor driveability, and incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine necessary action.
  - 04.03 Check fuel for contaminants and quality; determine necessary action.
  - 04.04 Inspect and test mechanical and electrical fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action.
  - 04.05 Replace fuel filters.
  - 04.06 Inspect and test cold enrichment system and components; perform
  - 04.07 Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
  - 04.08 Inspect and test fuel injectors.
  - 04.09 Check idle speed and fuel mixture.
  - 04.10 Adjust idle speed and fuel mixture.

- 04.11 Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s) and heat shield(s); perform necessary action.
  - 04.12 Perform exhaust system back-pressure test; determine necessary action.
  - 04.13 Test the operation of turbocharger/supercharger systems; determine necessary action.
  - 04.14 Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action.
  - 04.15 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
- 05.0 Demonstrate proficiency in fuel, air induction, positive crankcase ventilation and exhaust systems diagnosis and repair --The student will be able to:
- 05.01 Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action.
  - 05.02 Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.
  - 05.03 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.
  - 05.04 Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems determine necessary action.
  - 05.05 Inspect and test mechanical components of secondary air injection systems; perform necessary action.
  - 05.06 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.
  - 05.07 Inspect and test catalytic converter performance
- 06.0 Demonstrate proficiency in intake air temperature controls, early fuel evaporation (intake manifold temperature) controls and evaporative emissions controls --The student will be able to:
- 06.01 Diagnose emissions and driveability problems resulting from malfunctions in the intake air temperature control system; determine necessary action.
  - 06.02 Inspect and test components of intake air temperature control system; perform necessary action.
  - 06.03 Diagnose emissions and driveability problems resulting from malfunctions of early fuel evaporation control systems; determine necessary action.
  - 06.04 Inspect and test components of early fuel evaporation control system; perform necessary action.
  - 06.05 Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system; determine necessary action.
  - 06.06 Inspect and test components and hoses of evaporative emissions control system; perform necessary action.
  - 06.07 Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action.
- 07.0 Demonstrate proficiency in engine related service --The student will be able to:
- 07.01 Adjust valves on engines with mechanical or hydraulic lifters.

- 07.02 Remove and replace timing belt; verify correct camshaft timing.
- 07.03 Remove and replace thermostat.
- 07.04 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.
- 08.0 Use information technology tools. -- The students will be able to:
- 08.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 08.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 08.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 08.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 09.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 09.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 09.02 Describe the effect of money management on personal and career goals. FL 3.0
- 09.03 Develop a personal budget and financial goals. FL3.1
- 09.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 09.05 Maintain financial records. FL3.3
- 09.06 Read and reconcile financial statements. FL3.4
- 09.07 Research, compare and contrast investment opportunities.

**Course Number: AER0257****Occupational Completion Point: B****Automatic Transmission and Transaxle Technician – 150 Hours – SOC Code 49-3023**

- 22.0 Demonstrate proficiency in the operation and servicing of automatic transmission/transaxle--The student will be able to:
- 22.01 Identify and interpret transmission concern; assure proper engine operation; determine necessary action.
- 22.02 Research applicable vehicle and service information, such as transmission/transaxle system operation, vehicle service history, service precautions, and technical service bulletins.
- 22.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
- 22.04 Diagnose fluid usage, level, and condition concerns; determine necessary action.
- 22.05 Perform pressure tests; determine necessary action.
- 22.06 Perform lock-up converter system tests; determine necessary action.
- 22.07 Diagnose electronic, mechanical, hydraulic, vacuum control systems concerns; determine necessary action.
- 22.08 Diagnose noise and vibration concerns; determine necessary action.
- 22.09 Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.

23.0 Demonstrate proficiency in transmission/transaxle maintenance, adjustment and in-vehicle transmission/transaxle repair --The student will be able to:

- 23.01 Inspect, adjust or replace throttle valve (TV) linkages or cables; manual shift linkages or cables; transmission range sensor; check gear select indicator (as applicable).
- 23.02 Service transmission; perform visual inspection; replace fluids and filters.
- 23.03 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.
- 23.04 Inspect, repair, and replace governor assembly.
- 23.05 Inspect and replace external seals and gaskets.
- 23.06 Inspect extension housing; bushings and seals; perform
- 23.07 Inspect, leak test, flush, and replace cooler, lines, and fittings.
- 23.08 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 23.09 Diagnose electronic transmission control systems using a scan tool; determine necessary action.
- 23.10 Inspect, replace, and align powertrain mounts.

24.0 Demonstrate proficiency in off-vehicle transmission/transaxle repair (removal, disassembly, and reinstallation), oil pump and converter--The student will be able to:

- 24.01 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 24.02 Remove and reinstall transaxle and torque converter assembly.
- 24.03 Disassemble, clean, and inspect transmission/trans-axle.
- 24.04 Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets), and torque valve body bolts.
- 24.05 Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action.
- 24.06 Inspect accumulator bore, piston, seals, spring, and retainers; determine necessary action.
- 24.07 Assemble transmission/trans-axle.
- 24.08 Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas.
- 24.09 Measure torque converter end play and check for interference; check stator clutch.
- 24.10 Inspect, measure, and replace oil pump assembly and components.

25.0 Demonstrate proficiency in gear train, shafts, bushings, case, friction units and reaction units --The student will be able to:

- 25.01 Measure end play or preload; determine necessary action.
- 25.02 Inspect, measure, and replace thrust washers and bearings.
- 25.03 Inspect oil delivery seal rings, ring grooves, and sealing surface areas.
- 25.04 Inspect bushings; determine necessary action.
- 25.05 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); determine necessary action.
- 25.06 Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action
- 25.07 Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.

- 25.08 Inspect, measure, repair, adjust or replace transaxle final drive components.
  - 25.09 Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action.
  - 25.10 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action.
  - 25.11 Measure clutch pack clearance; determine necessary action.
  - 25.12 Air test operation of clutch and servo assemblies.
  - 25.13 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed.
  - 25.14 Inspect bands and drums; adjust or determine necessary action.
- 26.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 26.01 Describe the nature and types of business organizations. SY 1.0
  - 26.02 Explain the effect of key organizational systems on performance and quality.
  - 26.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 26.04 Explain the impact of the global economy on business organizations.

**Course Number: AER0274****Occupational Completion Point: C****Manual Drivetrain and Axle Technician – 150 Hours – SOC Code 49-3023**

- 16.0 Demonstrate proficiency in general drive train diagnosis, clutch diagnosis and repair --  
The student will be able to:
- 16.01 Identify and interpret drive train concern; determine necessary action.
  - 16.02 Research applicable vehicle and service information, such as drive train system operation, vehicle service history, service precautions, and technical service bulletins.
  - 16.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).
  - 16.04 Diagnose fluid usage, level, and condition concerns; determine necessary action.
  - 16.05 Drain and fill manual transmission/transaxle and final drive unit.
  - 16.06 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.
  - 16.07 Inspect, clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.
  - 16.08 Inspect, hydraulic clutch slave and master-cylinders, lines and hoses; perform necessary action.
  - 16.09 Inspect, release (throw-out) bearing, lever, and pivot; perform necessary action.
  - 16.10 Inspect and replace clutch pressure plate assembly and clutch disc.
  - 16.11 Bleed clutch hydraulic system.
  - 16.12 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable).
  - 16.13 Inspect, flywheel and ring gear for wear and cracks, measure run out; determine necessary action.
  - 16.14 Inspect engine block, clutch (bell) housing, and transmission/trans-axle case mating surface; determine necessary action.
  - 16.15 Measure flywheel-to-block run out and crankshaft end play; determine necessary action.

- 17.0 Demonstrate proficiency in transmission & transaxle diagnosis and repair --The student will be able to:
- 17.01 Remove and reinstall transmission/transaxle.
  - 17.02 Disassemble, clean, and reassemble transmission/transaxle components.
  - 17.03 Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.
  - 17.04 Diagnose noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action.
  - 17.05 Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.
  - 17.06 Inspect and reinstall powertrain mounts.
  - 17.07 Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.
  - 17.08 Remove and replace transaxle final drive.
  - 17.09 Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanisms, interlocks, and springs.
  - 17.10 Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.
  - 17.11 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
  - 17.12 Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
  - 17.13 Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.
  - 17.14 Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.
  - 17.15 Inspect lubrication devices (oil pump or slingers); perform necessary action.
  - 17.16 Inspect, test, and replace transmission/transaxle sensors and switches.
- 18.0 Demonstrate proficiency in drive and half shaft universal and constant-velocity (CV) joint diagnosis and repair --The student will be able to:
- 18.01 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.
  - 18.02 Diagnose universal joint noise and vibration concerns; perform necessary action.
  - 18.03 Replace front wheel drive (FWD) front wheel bearing.
  - 18.04 Inspect, service, and replace shafts, yokes, boots, and CV joints.
  - 18.05 Inspect, service, and replace shaft center support bearings.
  - 18.06 Check shaft balance; measure shaft run out; measure and adjust driveline angles.
- 19.0 Demonstrate proficiency in rear axle diagnosis and repair; ring and pinion gears, differential case assembly and limited slip differential --The student will be able to:
- 19.01 Diagnose noise and vibration concerns; determine necessary action.
  - 19.02 Diagnose fluid leakage concerns; determine necessary action.
  - 19.03 Inspect and replace companion flange and pinion seal; measure companion flange run out.
  - 19.04 Inspect ring gear and measure run out; determine necessary action.

- 19.05 Remove, inspect, and reinstall drive pinion and ring, gear, spacers, sleeves, and bearings.
  - 19.06 Measure and adjust drive pinion depth.
  - 19.07 Measure and adjust drive pinion bearing preload.
  - 19.08 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup and shim types).
  - 19.09 Check ring and pinion tooth contact patterns; perform necessary action.
  - 19.10 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
  - 19.11 Reassemble and reinstall differential case assembly; measure run out; determine necessary action.
  - 19.12 Diagnose noise, slippage, and chatter concerns; determine necessary action.
  - 19.13 Inspect and flush differential housing; refill with correct lubricant.
  - 19.14 Inspect and reinstall clutch (cone or plate) components.
  - 19.15 Measure rotating torque; determine necessary action.
- 20.0 Demonstrate proficiency in drive axle shaft and four-wheel drive/all-wheel drive component diagnosis and repair --The student will be able to:
- 20.01 Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.
  - 20.02 Inspect and replace rear axle shaft wheel studs.
  - 20.03 Remove and replace drive axle shafts.
  - 20.04 Inspect and replace drive axle shaft seals, bearings, and retainers.
  - 20.05 Measure drive axle flange run out and shaft end play; determine necessary action.
  - 20.06 Diagnose noise, vibration, and unusual steering concerns; determine necessary action.
  - 20.07 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
  - 20.08 Remove and reinstall transfer case.
  - 20.09 Disassemble, service, and reassemble transfer case and components.
  - 20.10 Inspect, front-wheel bearings and locking hubs; perform necessary action.
  - 20.11 Check drive assembly seals and vents; check lube level.
  - 20.12 Diagnose, test, adjust and replace electrical/electronic components of four-wheel drive systems.
- 21.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 21.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 21.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 21.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 21.04 Interpret and explain written organizational policies and procedures. ELR 2.0



**Course Number: AER0172**  
**Occupational Completion Point: D**  
**Automotive Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3023**

10.0 Demonstrate proficiency in A/C system diagnosis and repair --The student will be able to:

- 10.01 Identify and interpret heating and air conditioning concern; determine necessary action.
- 10.02 Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins.
- 10.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).
- 10.04 Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration.
- 10.05 Diagnose unusual operating noises in the A/C system; determine necessary action.
- 10.06 Identify refrigerant type; conduct a performance test of the A/C System; determine necessary action
- 10.07 Leak test A/C system; determine necessary action.
- 10.08 Inspect the condition of discharged oil; determine necessary action.
- 10.09 Determine recommended oil for system application.

11.0 Demonstrate proficiency in refrigeration system component diagnosis and repair of compressor, compressor clutch, evaporator, receiver/drier, condenser, etc. --The student will be able to:

- 11.01 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
- 11.02 Inspect A/C compressor drive belts; replace and adjust as needed.
- 11.03 Inspect, test, and replace A/C compressor clutch components or assembly.
- 11.04 Remove and replace A/C compressor and mountings; determine necessary action.
- 11.05 Determine need for A/C system filter; perform necessary action.
- 11.06 Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action.
- 11.07 Inspect A/C condenser for air flow restrictions; perform necessary action.
- 11.08 Remove and install receiver/drier or accumulator/drier.
- 11.09 Remove and install expansion valve or orifice (expansion) tube.
- 11.10 Inspect evaporator housing water drain; perform necessary action.
- 11.11 Remove and reinstall evaporator; measure oil quantity; determine necessary action.
- 11.12 Remove and reinstall condenser; measure oil quantity; determine necessary action.

12.0 Demonstrate proficiency in heating and engine cooling systems diagnosis and repair --The student will be able to:

- 12.01 Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
  - 12.02 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.
  - 12.03 Inspect engine cooling and heater system hoses and belts; perform necessary action.
  - 12.04 Inspect, test, and replace thermostat and housing.
  - 12.05 Determine coolant condition; drain and recover coolant.
  - 12.06 Flush system; refill with recommended coolant; bleed system.
  - 12.07 Inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action.
  - 12.08 Inspect and test electrical fan control system and circuits, determine necessary action.
  - 12.09 Inspect and test heater control valve(s); perform necessary action.
  - 12.10 Remove and reinstall heater core.
- 13.0 Demonstrate proficiency in A/C operating systems and related controls diagnosis and repairs --The student will be able to:
- 13.01 Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action.
  - 13.02 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.
  - 13.03 Test and diagnose A/C compressor clutch control systems; determine necessary action.
  - 13.04 Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.
  - 13.05 39.05 Inspect and test A/C-heater control panel assembly; determine necessary action.
  - 13.06 39.06 Inspect and test A/C-heater control cables and linkages perform necessary action.
  - 13.07 Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action.
  - 13.08 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.
- 14.0 Demonstrate proficiency refrigerant recovery, recycling, and handling --The student will be able to:
- 14.01 Perform correct use and maintenance of refrigerant handling equipment.
  - 14.02 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.
  - 14.03 Recycle refrigerant.
  - 14.04 Label and store refrigerant.
  - 14.05 Test recycled refrigerant for non-condensable gases.
  - 14.06 Evacuate and charge A/C system.
- 15.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 15.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0

- 15.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 15.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 15.04 Employ mentoring skills to inspire and teach others. LT 5.0

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Service Technology 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T500100
CIP Number	0649030605
Grade Level	30,31
Standard Length	600 hours
Teacher Certification	DIESEL MECH @7 G GASENG RPR @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: service, repair and overhaul of four-stroke and two-stroke cycle engines and outboard motors; and service and repair of boating accessories. With regard to the above, course content will include electrical systems, fuel systems, power transfer systems, ignition systems, cooling systems, lubrication systems, drive systems and boat and trailer rigging.

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

### **Program Structure**

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0003	Marine Rigger	300	49-3051
B	MTE0050	Outboard Engine Technician 1	300	49-3051

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for employment as machinery mechanics; marine engines, or outboard motor mechanics.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Marine Service industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the

student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Perform shop practices to industry standards.
- 02.0 Maintain and repair basic four-stroke cycle engines.
- 03.0 Maintain and repair basic two-stroke cycle engines.
- 04.0 Maintain and repair electrical systems.
- 05.0 Maintain and repair fuel systems.
- 06.0 Maintain and repair two-stroke cycle carburetors.
- 07.0 Use marine woods, metals and fiberglass.
- 08.0 Adjust and repair trailers.
- 09.0 Prepare and deliver sales merchandise.
- 10.0 Parts specialist and computer skills to industry standards.
- 11.0 Maintain and repair cooling systems.
- 12.0 Maintain and repair lubrication systems.
- 13.0 Demonstrate mathematics knowledge and skills.
- 14.0 Demonstrate science knowledge and skills
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 16.0 Perform gasket/seal operations and electronic test skills to industry standards.
- 17.0 Maintain and repair basic two stroke cycle outboard engines.
- 18.0 Maintain and repair outboard fuel systems.
- 19.0 Maintain and repair outboard cooling systems.
- 20.0 Maintain and repair outboard lubrication systems.
- 21.0 Maintain and repair outboard lower gear cases.
- 22.0 Demonstrate language arts knowledge and skills

- 23.0 Solve problems using critical thinking skills, creativity and innovation.
- 24.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.



2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Marine Service Technology 1**  
**PSAV Number: T500100**

**Course Number: MTE0003**  
**Occupational Completion Point: A**  
**Marine Rigger – 300 Hours – SOC Code 49-3051**

- 01.0 Perform shop practices to industry standards--The student will be able to:
- 01.01 Comply with safety rules and regulations.
  - 01.02 Use hand tools safely and properly.
  - 01.03 Set up and use power tools safely and properly.
  - 01.04 Set up and use precision measuring tools.
  - 01.05 Drill and remove broken studs and install helicoils.
  - 01.06 Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility.
  - 01.07 Read, interpret and apply service manuals.
  - 01.08 Locate and match electrical units by their symbols on a wiring diagram.
  - 01.09 Demonstrate appropriate heating, cutting, and welding skills.
- 02.0 Maintain and repair basic four-stroke cycle engines--The student will be able to:
- 02.01 Explain the basic principles of the operation of four-stroke cycle internal combustion engines.
  - 02.02 Identify types of four-stroke cycle engines.
  - 02.03 Locate engine serial and model numbers.
  - 02.04 Identify engine assemblies and systems.
- 03.0 Maintain and repair basic two-stroke cycle engines--The student will be able to:
- 03.01 Explain the basic principles of the operation of two-stroke cycle internal combustion engines.
  - 03.02 Identify types of engines.
  - 03.03 Locate engine serial and model numbers.
  - 03.04 Identify engine assemblies and systems.
- 04.0 Maintain and repair electrical systems--The student will be able to:
- 04.01 Set up and use voltmeters, ammeters and ohmmeters.
  - 04.02 Locate and identify electrical circuit components.
  - 04.03 Sketch a typical circuit using a single wire system.
  - 04.04 Test storage batteries using a hydrometer.
  - 04.05 Test storage batteries using a light and load test.
  - 04.06 Charge storage batteries.
  - 04.07 Remove and replace batteries and service battery boxes.
  - 04.08 Repair damaged wire and electrical harnesses.

- 04.09 Diagnose circuit troubles using continuity or a test light and low reading voltmeters to record voltage drop.
  - 04.10 Sketch and label typical fuel gage systems.
  - 04.11 Remove and replace ammeters or indicating lights.
  - 04.12 Remove and replace fuel gages.
  - 04.13 Remove and replace fuel-sending units.
  - 04.14 Diagnose gages and accessory system troubles using test lights, voltmeters, ammeters or detached sending units.
  - 04.15 Sketch typical circuits such as those for auto bilge pumps or navigation lights.
  - 04.16 Locate opens, shorts and grounds.
  - 04.17 Demonstrate proficiency in soldering/splicing skills.
- 05.0 Maintain and repair fuel systems--The student will be able to:
- 05.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
  - 05.02 Sketch and label the parts of total fuel systems.
  - 05.03 Service fuel lines and primer bulbs (vacuum test).
  - 05.04 Remove, clean, inspect and install fuel tanks.
  - 05.05 Identify basic carburetor circuits (chokes, floats, fuel inlets; idle, intermediate and high speeds; mains, etc.)
  - 05.06 Identify and locate fuel pumps.
  - 05.07 Determine and make appropriate fuel oil mixtures.
- 06.0 Maintain and repair two-stroke cycle carburetors--The student will be able to:
- 06.01 Remove, clean, overhaul, replace and make final adjustments to carburetors.
  - 06.02 Diagnose exhaust problems such as back pressure and scavenging.
- 07.0 Use marine woods, metals, and fiberglass--The student will be able to:
- 07.01 Explain the hazards of a marine environment to woods, metals and fiberglass.
  - 07.02 Explain a galvanic series.
  - 07.03 Explain the theory for using given materials in boat repair activities.
- 08.0 Adjust and repair trailers--The student will be able to:
- 08.01 Make boat to trailer adjustments.
  - 08.02 Remove and replace lighting systems.
  - 08.03 Remove and replace wheel bearings and springs.
  - 08.04 Remove and replace brakes.
  - 08.05 Service and install trim and tilt systems.
  - 08.06 Remove and test cylinder rams.
  - 08.07 Adjust reverse locks.
  - 08.08 Adjust the trim and tilt.
- 09.0 Prepare and deliver sales merchandise--The student will be able to:
- 09.01 Make center line measurements for outboard motor installation.
  - 09.02 Center the plate height.
  - 09.03 Locate manufacturers' I.D. plates.
  - 09.04 Mount control boxes at the helm.

- 09.05 Place wiring and cables in a neat and orderly manner.
  - 09.06 Adjust the control cables from the engine to the control box.
  - 09.07 Center the steering cable to the engine.
  - 09.08 Find suitable locations for accessories and mount them to the boat.
  - 09.09 Lubricate shafts, install propellers and fasten both securely.
  - 09.10 Check for proper levels.
  - 09.11 Check manufacturers' specifications.
  - 09.12 Test-run boats.
  - 09.13 Recheck work completed.
  - 09.14 Check manufacturers' installation procedures for stern drive units.
  - 09.15 Lubricate shafts and install propellers securely.
  - 09.16 Obtain maximum oil level capacity.
  - 09.17 Install or connect drain plugs, petcocks, hose clamps, hoses, etc.
  - 09.18 Find a suitable mount location and mount the engine securely in the boat.
  - 09.19 Set engines to manufacturers' specifications.
  - 09.20 Set, adjust and test engines to manufacturers' specifications.
  - 09.21 Remove and replace running lights.
  - 09.22 Troubleshoot lighting systems and accessories.
  - 09.23 Check and adjust throttles, cables, horns, lights and tachometers.
- 10.0 Parts specialist and computer skills to industry standards--The student will be able to:
- 10.01 Identify the skills needed to be a service writer.
  - 10.02 Identify the skills needed to be a parts specialist.
  - 10.03 Demonstrate appropriate computer skills.
  - 10.04 Identify gaskets and seals.
  - 10.05 Demonstrate knowledge of different parts and accessories.
- 11.0 Maintain and repair cooling systems--The student will be able to:
- 11.01 Explain the principles of cooling systems, including fresh water cooling systems.
  - 11.02 Trace water flow through cooling systems.
- 12.0 Maintain and repair lubrication systems--The student will be able to:
- 12.01 Identify the types and functions of lubrication systems.
  - 12.02 Explain the principles of lubrication systems.
  - 12.03 Identify and locate components of lubrication systems.
- 13.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0
- 13.01 Demonstrate knowledge of arithmetic operations. AF3.2
  - 13.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
  - 13.03 Construct charts/tables/graphs using functions and data. AF3.5
- 14.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 14.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1

- 14.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.AF4.3
- 15.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 15.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 15.02 Locate, organize and reference written information from various sources. CM 3.0
  - 15.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 15.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 15.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 15.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 15.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: MTE0050****Occupational Completion Point: B****Outboard Engine Technician (1 of 2) – 300 Hours – SOC Code 49-3051**

- 16.0 Perform gasket/seal operations and electronic test equipment skills to industry standards--The student will be able to:
- 16.01 Identify and make gaskets and seals.
  - 16.02 Demonstrate appropriate skills in computerized test equipment.
- 17.0 Maintain and repair basic two-stroke cycle outboard engines--The student will be able to:
- 17.01 Disassemble engines.
  - 17.02 Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
  - 17.03 Diagnose head problems by use of the visual inspection method.
  - 17.04 Diagnose head problems by use of the compression tester method.
  - 17.05 Diagnose head problems by use of cylinder air pressure method.
  - 17.06 Diagnose head problems by use of the stethoscope method.
  - 17.07 Remove, clean and inspect piston rods and assemblies.
  - 17.08 Measure out-of-round of pistons and cylinders.
  - 17.09 Hone cylinders.
  - 17.10 Check the total bearing surface of connecting rod bearings.
  - 17.11 Measure piston skirts and ring grooves.
  - 17.12 Measure the piston ring gap in cylinder bores.
  - 17.13 Install piston pins according to manufacturer's specifications.
  - 17.14 Check rod and piston assembly alignment.
  - 17.15 Install rings on pistons.
  - 17.16 Install piston rod assemblies.
  - 17.17 Measure and check crankshafts with a micrometer.
  - 17.18 Check needle bearings.
  - 17.19 Inspect crankshafts and install seal.
  - 17.20 Inspect, clean and/or replace reed valves.
  - 17.21 Reassemble engines.

18.0 Maintain and repair outboard fuel systems--The student will be able to:

- 18.01 Identify the major types of carburetors.
- 18.02 Check and adjust throttle and governor linkages.
- 18.03 Identify and service different types of EFI systems.
- 18.04 Remove, service and replace air cleaners.
- 18.05 Diagnose carburetor problems.

19.0 Maintain and repair outboard cooling systems--The student will be able to:

- 19.01 Disassemble and reassemble water pumps.
- 19.02 Remove, check and replace thermostats.
- 19.03 Use thermostat pressure relief systems.
- 19.04 Service manifolds and thermostat housings.

20.0 Maintain and repair outboard lubrication systems--The student will be able to:

- 20.01 Check engines for oil leaks.
- 20.02 Change engine oil and filters.
- 20.03 Check engine oil pressure and level.
- 20.04 Recognize and use only recommended oil.
- 20.05 Inspect and service oil-metering systems.

21.0 Maintain and repair outboard lower gear cases--The student will be able to:

- 21.01 Remove and replace lower gear cases.
- 21.02 Reshim lower gear cases.
- 21.03 Refill lower gear cases with specified oil.
- 21.04 Determine propeller pitch diameter and hub type.

22.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0

- 22.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 22.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 22.03 Present information formally and informally for specific purposes and audiences. AF2.9

23.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:

- 23.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 23.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 23.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 23.04 Conduct technical research to gather information necessary for decision-making. PS 4.0

- 24.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 24.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 24.02 Explain emergency procedures to follow in response to workplace accidents.
  - 24.03 Create a disaster and/or emergency response plan. SHE 2.0

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Marine Service Technology 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T500200
CIP Number	0649030606
Grade Level	30,31
Standard Length	750 hours
Teacher Certification	DIESEL MECH @7 G GASENG RPR @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: service, repair and overhaul of four-stroke and two-stroke cycle engines and outboard motors; and service and repair of boating accessories. With regard to the above, course content will include electrical systems, fuel systems, power transfer systems, ignition systems, cooling systems, lubrication systems, drive systems and boat and trailer rigging.

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

### Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0070	Outboard Engine Technician 2	300	49-3051
B	MTE0183	Stern Drive Technician	150	49-3051
C	MTE0054	Inboard Gas Technician	150	49-3051
D	MTE0056	Inboard Diesel Technician	150	49-3051

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for employment as machinery mechanics; marine engines, or outboard motor mechanics.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Marine Service industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

The standard length of this program is 750 hours. **Marine Service Technology 1** is a core program. It is recommended students complete **Marine Service Technology 1**, or demonstrate mastery of the outcomes in that program, prior to enrollment in **Marine Service Technology 2**.

### Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.



## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Maintain and repair outboard cranking systems.
- 02.0 Maintain and repair outboard magneto systems.
- 03.0 Maintain and repair outboard battery ignition systems.
- 04.0 Maintain and repair outboard capacitor discharge ignition systems.
- 05.0 Maintain and repair outboard charging systems.
- 06.0 Perform outboard upper to lower gear case maintenance.
- 07.0 Assemble and maintain outboard lower units and housing assemblies.
- 08.0 Use information technology tools
- 09.0 Describe the importance of professional ethics and legal responsibilities.
- 10.0 Demonstrate personal money-management concepts, procedures, and strategies
- 11.0 Maintain and repair basic four-stroke cycle stern drive engines.
- 12.0 Maintain and repair stern drive fuel systems.
- 13.0 Maintain and repair stern drive cooling systems.
- 14.0 Maintain and repair stern drive lubrication systems.
- 15.0 Maintain and repair stern drive upper gear case.
- 16.0 Maintain and repair stern drive lower gear case.
- 17.0 Maintain and repair stern drive battery ignition.
- 18.0 Maintain and repair stern drive; capacitor discharge ignition system.

- 19.0 Maintain and repair stern drive intermediate housing.
- 20.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 21.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 22.0 Explain the importance of employability and entrepreneurship skills
- 23.0 Perform parts manual activities to industry standards.
- 24.0 Maintain and repair basic four-stroke cycle inboard gas engine.
- 25.0 Maintain and repair inboard fuel systems.
- 26.0 Maintain and repair inboard gas cooling systems.
- 27.0 Maintain and repair inboard gas lubrication systems.
- 28.0 Maintain and repair inboard gas fuel systems.
- 29.0 Maintain and repair inboard gas transmissions.
- 30.0 Maintain and repair inboard diesel fuel systems.
- 31.0 Maintain and repair inboard diesel cooling systems.
- 32.0 Maintain and repair inboard diesel lubrication systems.
- 33.0 Maintain and repair inboard diesel charging systems.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Marine Service Technology 2**  
**PSAV Number: T500200**

**Course Number: MTE0070**  
**Occupational Completion Point: A**  
**Outboard Engine Technician 2 – 300 Hours – SOC Code 49-3051**

01.0 Maintain and repair outboard cranking systems--The student will be able to:

- 01.01 Disassemble recoil starters.
- 01.02 Inspect components of recoil starters.
- 01.03 Reassemble recoil starters.
- 01.04 Identify components of electrical starting systems.
- 01.05 Disassemble different types of starting motors.
- 01.06 Bench test armatures.
- 01.07 Bench test field coils.
- 01.08 Bench test drive units.
- 01.09 Bench test switches.
- 01.10 Bench test minor parts of starting motor components.
- 01.11 Install, reassemble and test new starter parts.
- 01.12 Troubleshoot starting systems using battery starter testers.
- 01.13 Set up and use battery starter (load) testers.
- 01.14 Locate opens, short and grounds.

02.0 Maintain and repair outboard magneto ignition systems--The student will be able to:

- 02.01 Sketch and label electrical symbols.
- 02.02 Set up and use ohmmeters.
- 02.03 Set up and use voltmeters.
- 02.04 Set up and use ignition testers.
- 02.05 Set up and use ignition analyzers.
- 02.06 Locate and identify parts of magneto ignitions.
- 02.07 Locate and match electrical units by their symbols on a wiring diagram.
- 02.08 Sketch and label complete magneto ignition systems.
- 02.09 Check coil resistance with an ohmmeter.
- 02.10 Check points for continuity and resistance.
- 02.11 Check condensers for capacity, leaks and shorts.
- 02.12 Clean and regap spark plugs.

03.0 Maintain and repair outboard battery ignition systems--The student will be able to:

- 03.01 Locate and identify parts of battery ignition systems.
- 03.02 Locate and match electrical units by their symbols on a wiring diagram.
- 03.03 Sketch and label complete battery ignition systems.
- 03.04 Check coil resistance with an ohmmeter.
- 03.05 Check points for continuity and resistance.
- 03.06 Check condensers for capacity, leaks and shorts.

- 03.07 Set up and use test equipment.
- 03.08 Set timing using timing light.
  
- 04.0 Maintain and repair outboard capacitor discharge ignition systems--The student will be able to:
  - 04.01 Sketch and label electrical symbols.
  - 04.02 Set up and use ohmmeters.
  - 04.03 Set up and use a CD-77 or equivalent.
  - 04.04 Set up and use spark testers.
  - 04.05 Set up and use neon test lights.
  - 04.06 Set up and use low/high ammeters.
  - 04.07 Set up and use voltmeters.
  - 04.08 Locate and identify parts of capacitor discharge ignition systems.
  - 04.09 Locate and match electrical units by their symbols on a wiring diagram.
  - 04.10 Sketch and label complete C/D ignition systems.
  - 04.11 Check coil resistance, shorts and grounds with an ohmmeter.
  - 04.12 Check stator windings with an ohmmeter.
  - 04.13 Check sensor coils, charge coils, ignition coils and shorts to ground with a CD-77 or equivalent.
  - 04.14 Check power packs with an ohmmeter and a CD-77 equivalent.
  
- 05.0 Maintain and repair outboard charging systems--The student will be able to:
  - 05.01 Sketch and label the units of complete charging circuits.
  - 05.02 Disassemble charging systems and identify the components.
  - 05.03 Perform stator and rectifier testing on charging systems.
  - 05.04 Reassemble and test charging systems.
  - 05.05 Set up and use ohmmeters.
  - 05.06 Test regulators.
  - 05.07 Reassemble and test complete units.
  
- 06.0 Perform outboard upper to lower gear case maintenance--The student will be able to:
  - 06.01 Disassemble exhaust housings.
  - 06.02 Inspect seals, "O" rings, shafts and bearings.
  - 06.03 Reassemble exhaust housings.
  
- 07.0 Assemble and maintain outboard lower units and housing assemblies--The student will be able to:
  - 07.01 Disassemble and reassemble steering handle groups.
  - 07.02 Disassemble and assemble exhaust housings and water tube assemblies.
  - 07.03 Replace motor mounts and shock absorbers.
  - 07.04 Lubricate all fittings.
  - 07.05 Pressure and vacuum test gear cases.
  - 07.06 Remove and test cylinders and rams.
  - 07.07 Adjust reverse locks.
  - 07.08 Adjust the trim and tilt.
  - 07.09 Determine the differences between mechanical, electrical and hydraulic shifting units.

- 07.10 Explain the shifting theory of the lower unit.
  - 07.11 Disassemble and reassemble mechanical shifting units.
  - 07.12 Disassemble and reassemble electrical shifting units.
  - 07.13 Disassemble and reassemble hydraulic shifting units.
  - 07.14 Inspect all parts for wear.
- 08.0 Use information technology tools. -- The students will be able to:
- 08.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 08.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 08.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
  - 08.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 09.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 09.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 09.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 09.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 09.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 10.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 10.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 10.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 10.03 Develop a personal budget and financial goals. FL3.1
  - 10.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 10.05 Maintain financial records. FL3.3
  - 10.06 Read and reconcile financial statements. FL3.4
  - 10.07 Research, compare and contrast investment opportunities.

**Course Number: MTE0183****Occupational Completion Point: B****Stern Drive Technician – 150 Hours – SOC Code 49-3051**

- 11.0 Maintain and repair basic four-stroke cycle stern drive engines--The student will be able to:
- 11.01 Diagnose valve and head problems by use of the visual inspection method.
  - 11.02 Diagnose valve and head problems by use of the compression tester method.
  - 11.03 Diagnose valve and head problems by use of the cylinder air pressure method.
  - 11.04 Disassemble engines and inspect parts.
  - 11.05 Clean and inspect heads for cracks, warpage and damaged spark plug threads.

- 11.06 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 11.07 Grind valve seats and reface valves.
- 11.08 Check and inspect springs for free height, distortion and installed height.
- 11.09 Adjust valve lash.
- 11.10 Move and inspect camshafts and lifters.
- 11.11 Measure camshafts.
- 11.12 Clean and inspect lifters for wear.
- 11.13 Time valve drive assemblies.
- 11.14 Remove pistons from rod assemblies.
- 11.15 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 11.16 Check piston pins and bosses for wear.
- 11.17 Measure piston ring lands width, out-of-round and taper.
- 11.18 Measure the piston ring gap in cylinder bores.
- 11.19 Install and fit piston pins.
- 11.20 Check rod and piston assembly alignment.
- 11.21 Remove and replace rod bearings.
- 11.22 Hone and clean cylinders.
- 11.23 Install rings on pistons.
- 11.24 Measure and check crankshafts with a micrometer.
- 11.25 Check for end play.
- 11.26 Check bearing bores with a telescoping gage.
- 11.27 Reassemble engines.
- 11.28 Install oil seals.

12.0 Maintain and repair stern drive fuel systems--The student will be able to:

- 12.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 12.02 Sketch and label the parts of total fuel systems.
- 12.03 Service fuel lines.
- 12.04 Remove, clean and install fuel tanks.
- 12.05 Identify and locate fuel pump vacuums.
- 12.06 Remove, replace service and check the pressure of fuel pumps.
- 12.07 Remove, clean and replace in-line filters.
- 12.08 Identify the major types of carburetors.
- 12.09 Check and adjust throttle and governor linkages.
- 12.10 Identify and service different types of EFI systems.
- 12.11 Identify and understand different types of evaporative control systems.

13.0 Maintain and repair stern drive cooling systems--The student will be able to:

- 13.01 Explain the principles of cooling systems, including fresh water cooling systems.
- 13.02 Trace water flow through cooling systems.
- 13.03 Disassemble and reassemble water pumps.
- 13.04 Remove, check and replace thermostats.
- 13.05 Use thermostat pressure relief systems.
- 13.06 Service manifolds, risers and thermostat housings.
- 13.07 Service water-cooling systems for gas inboard.

14.0 Maintain and repair stern drive lubrication systems--The student will be able to:

- 14.01 Identify the types and functions of lubrication systems.

- 14.02 Explain the principles of lubrication systems.
  - 14.03 Identify and locate components of lubrication systems.
  - 14.04 Check engines for oil leaks.
  - 14.05 Change engine oil and filters.
  - 14.06 Check engine oil pressure and level.
  - 14.07 Recognize and use only recommended oil.
- 15.0 Maintain and repair stern drive upper gear case--The student will be able to:
- 15.01 Determine the differences between mechanical, electrical and hydraulic shifting units.
  - 15.02 Disassemble and reassemble each type of shifting unit.
  - 15.03 Reshim units to manufacturers' specifications.
  - 15.04 Use the proper oil to refill upper and lower gear cases.
- 16.0 Maintain and repair stern drive lower gear cases--The student will be able to:
- 16.01 Determine the differences between mechanical, electrical and hydraulic shifting.
  - 16.02 Remove and replace lower gear cases.
  - 16.03 Reshim lower gear cases.
  - 16.04 Refill lower gear cases with specified oil.
  - 16.05 Determine propeller pitch, diameter and hub type.
- 17.0 Maintain and repair stern drive battery ignition systems--The student will be able to:
- 17.01 Locate and match electrical units by their symbols on a wiring diagram.
  - 17.02 Sketch and label complete battery ignition systems.
  - 17.03 Set up and use test equipment.
  - 17.04 Set timing using a timing light
- 18.0 Maintain and repair stern drive capacitor discharge ignition systems--The student will be able to:
- 18.01 Sketch and label electrical symbols.
  - 18.02 Set up and use ohmmeters.
  - 18.03 Set up and use appropriate test equipment.
  - 18.04 Set up and use spark testers.
  - 18.05 Set up and use neon test lights.
  - 18.06 Set up and use low/high ammeters.
  - 18.07 Set up and use voltmeters.
  - 18.08 Locate and identify parts of capacitor discharge ignition systems.
  - 18.09 Locate and match electrical units by their symbols on a wiring diagram.
  - 18.10 Sketch and label complete C/D ignition systems.
  - 18.11 Check coil resistance, shorts and grounds with an ohmmeter.
  - 18.12 Check stator windings with an ohmmeter.
  - 18.13 Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment.
  - 18.14 Check power packs with an ohmmeter and appropriate test equipment.
- 19.0 Maintain and repair stern drive intermediate housings--The student will be able to:



- 19.01 Disassemble main drive shafts.
  - 19.02 Shim drive shafts to intermediate housings.
  - 19.03 Remove and replace clutch assemblies.
  - 19.04 Check electrical components with proper test equipment.
  - 19.05 Remove and replace "U" joints.
  - 19.06 Disassemble outer transom plates.
  - 19.07 Adjust trim and limit switches.
  - 19.08 Disassemble cylinder rams.
- 20.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 20.01 Describe the nature and types of business organizations. SY 1.0
  - 20.02 Explain the effect of key organizational systems on performance and quality.
  - 20.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 20.04 Explain the impact of the global economy on business organizations.
- 21.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 21.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 21.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 21.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 21.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 22.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 22.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
  - 22.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
  - 22.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 22.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 22.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 22.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 22.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 22.08 Research the benefits of ongoing professional development. ECD 9.0
  - 22.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: MTE0054**  
**Occupational Completion Point: C**  
**Inboard Gas Technician – 150 Hours – SOC Code 49-3051**

- 23.0 Perform parts manual activities to industry standards--The student will be able to:
- 23.01 Read and use parts manuals.
- 24.0 Maintain and repair basic four-stroke cycle inboard gas engines--The student will be able to:

- 24.01 Diagnose valve and head problems by use of the visual inspection method.
- 24.02 Diagnose valve and head problems by use of the compression tester method.
- 24.03 Diagnose valve and head problems by use of the cylinder air pressure method.
- 24.04 Disassemble engines and inspect parts.
- 24.05 Clean and inspect heads for cracks, warpage and damaged spark plug threads.
- 24.06 Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
- 24.07 Grind valve seats and reface valves.
- 24.08 Check and inspect springs for free height, distortion and installed height.
- 24.09 Adjust valve lash.
- 24.10 Remove and inspect camshafts and lifters.
- 24.11 Measure camshafts.
- 24.12 Clean and inspect lifters for wear.
- 24.13 Time valve drive assemblies.
- 24.14 Remove pistons from rod assemblies.
- 24.15 Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
- 24.16 Check piston pins and bosses for wear.
- 24.17 Measure piston ring lands width, out-of-round and taper.
- 24.18 Measure the piston ring gap in cylinder bores.
- 24.19 Install and fit piston pins.
- 24.20 Check rod and piston assembly alignment.
- 24.21 Remove and replace rod bearings.
- 24.22 Hone and clean cylinders.
- 24.23 Install rings on pistons.
- 24.24 Measure and check crankshafts with a micrometer.
- 24.25 Check for end play.
- 24.26 Check bearing bores with a telescoping gage.
- 24.27 Reassemble engines.
- 24.28 Install oil seals.

25.0 Maintain and repair inboard fuel systems--The student will be able to:

- 25.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 25.02 Sketch and label the parts of total fuel systems.
- 25.03 Service fuel lines.
- 25.04 Remove, clean and install fuel tanks.
- 25.05 Identify and locate fuel pump vacuums.
- 25.06 Remove, replace service and check the pressure of fuel pumps.
- 25.07 Remove, clean and replace in-line filters.
- 25.08 Identify the major types of carburetors.
- 25.09 Check and adjust throttle and governor linkages.
- 25.10 Identify and service different types of EFI systems.
- 25.11 Identify and understand different types of evaporative control systems.

26.0 Maintain and repair inboard gas cooling systems--The student will be able to:

- 26.01 Explain the principles of cooling systems, including fresh water cooling systems.
- 26.02 Trace water flow through cooling systems.
- 26.03 Disassemble and reassemble water pumps.
- 26.04 Remove, check and replace thermostats.
- 26.05 Use thermostat pressure relief systems.

- 26.06 Service manifolds, risers and thermostat housings.
- 26.07 Service water-cooling systems for gas inboard, gas outboard and diesel engines.

27.0 Maintain and repair inboard gas lubrication systems--The student will be able to:

- 27.01 Identify the types and functions of lubrication systems.
- 27.02 Explain the principles of lubrication systems.
- 27.03 Identify and locate components of lubrication systems.
- 27.04 Check engines for oil leaks.
- 27.05 Change engine oil and filters.
- 27.06 Check engine oil pressure and level.
- 27.07 Recognize and use only recommended oil.

28.0 Maintain and repair inboard gas fuel systems--The student will be able to:

- 28.01 Remove, service and replace carburetor air cleaners/flame arrestors.
- 28.02 Identify and locate fuel system components (fuel pumps, carburetors and air filters, linkages and intake manifolds).
- 28.03 Remove, clean, overhaul, replace and make final adjustments to carburetors.

29.0 Maintain and repair transmissions--The student will be able to:

- 29.01 Inspect planetary clutch plate air coupling assemblies
- 29.02 Remove and replace transmissions.
- 29.03 Use proper service tools in shimming, reassembly and testing.
- 29.04 Drain transmissions.
- 29.05 Determine capacity using the transmission service manuals.
- 29.06 Refill transmissions according to manufacturers' specifications.

**Course Number: MTE0056**

**Occupational Completion Point: D**

**Inboard Diesel Technician – 150 Hours – SOC Code 49-3051**

30.0 Maintain and repair inboard diesel fuel systems--The student will be able to:

- 30.01 Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
- 30.02 Sketch and label the parts of total fuel systems.
- 30.03 Service fuel lines.
- 30.04 Remove, clean and install fuel tanks.
- 30.05 Identify and locate fuel control devices.
- 30.06 Remove, replace service and check the pressure of fuel pumps.
- 30.07 Remove, clean and replace in-line filters.
- 30.08 Check and adjust throttle and governor linkages.
- 30.09 Check fuel systems for leaks.
- 30.10 Bleed systems for starting.
- 30.11 Adjust nozzle pressure to manufacturer's specifications.
- 30.12 Set the injection pump angle (timing).
- 30.13 Check or replace glow plugs.
- 30.14 Check; stop solenoids.

- 31.0 Maintain and repair inboard diesel cooling systems--The student will be able to:
  - 31.01 Disassemble and reassemble water pumps.
  - 31.02 Remove, check and replace thermostats.
  - 31.03 Use thermostat pressure relief systems.
  - 31.04 Service manifolds, risers and thermostat housings.
  - 31.05 Service water-cooling systems for diesel engines.
  
- 32.0 Maintain and repair inboard diesel lubrication systems--The student will be able to:
  - 32.01 Identify the types and functions of lubrication systems.
  - 32.02 Explain the principles of lubrication systems.
  - 32.03 Identify and locate components of lubrication systems.
  - 32.04 Check engines for oil leaks.
  - 32.05 Change engine oil and filters.
  - 32.06 Check engine oil pressure and level.
  - 32.07 Recognize and use only recommended oil.
  
- 33.0 Maintain and repair inboard diesel charging systems --The student will be able to:
  - 33.01 Inspect, remove and replace alternator belts.
  - 33.02 Check the output of charging systems.
  - 33.03 Analyze malfunctions.
  - 33.04 Test and overhaul alternators.
  - 33.05 Remove and replace regulators.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Advanced Automotive Service Technology 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T600100
CIP Number	0647060413
Grade Level	30, 31
Standard Length	800 Hours
Teacher Certification	AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 10.0 Reading: 10.0

### **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 competencies established by the Automotive Industry plus those included in the business plan and integration of academic requirements and training in communications, leadership, human relations, employability skills and safe, efficient work practices constitute the program curriculum.

### **Program Structure**

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0011	Automotive Maintenance Technician	400	49-3023
B	AER0319	Advanced Automotive Electrical/Electronic System Technician	400	49-3023

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for employment and/or specialized training in the automotive industry. The program provides specialized corporate/association job preparatory training.

This program requires a written business plan that establishes a partnership agreement between the educational institution and the automotive industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

All the NATEF tasks are assigned a priority number: P-1, P-2, or P-3. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the NATEF Policies section for additional information on the requirements for instruction on tasks.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for employment in the automotive service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

Occupational Completion Points may be reached before the end of a program. All outcomes must be completed to receive credit for an Occupational Completion Point (OCP).

1. It is assumed that:

- \* In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
  - \* The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
  - \* The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.
2. It is assumed that:
- \* All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published.
3. It is assumed that:
- \* Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
  - \* Learning progress of students will be monitored and evaluated against these performance standards;
  - \* A system is in place which informs all students of their individual progress through all phases of the training program.
4. It is assumed that:
- \* Individual courses of study will differ across automobile technician training programs;
  - \* Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.
5. It is assumed that:
- \* All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law";
  - \* Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

The program must be NATEF Master Certified and have a business plan approved by the appropriate industry affiliated organization. Instructors must be ASE Certified in all areas that they teach in addition to being certified in Engine Performance and Electrical/Electronic Systems. ASE Master Technician and Advanced Engine Performance (L1) ASE Certification is preferred. Instructors must meet the specific product certification as specified in the business plan.

Program must meet the equipment and specialty tool requirement as specified in the business plan. Must offer Federally recognized refrigerant-recycling certification training.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The

activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 10.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry.
- 02.0 Demonstrate mathematics knowledge and skills.
- 03.0 Demonstrate science knowledge and skills
- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 05.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry.
- 06.0 Demonstrate proficiency in routine maintenance and consumer services.
- 07.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic components as related to power train.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:           Advanced Automotive Technology 1**  
**PSAV Number:           T600100**

**Course Number: AER0011**  
**Occupational Completion Point: A**  
**Automotive Maintenance Technician – 400 Hours – SOC Code 49-3023**

01.0 Demonstrate proficiency in the equipment skills and safety regulations relating to the automotive industry--The student will be able to:

- 01.01 Apply shop safety rules, EPA and OSHA standards.
- 01.02 Identify and use appropriate emergency first aid procedures.
- 01.03 Identify, use and maintain hand and power tools properly.
- 01.04 Identify and practice using appropriate precision measuring tools and torque methods.
- 01.05 Identify and describe the proper procedure to apply and remove automotive fasteners, to include thread repair.
- 01.06 Identify and use metric and English measurement skills.
- 01.07 Use computer and operate keyboard.
- 01.08 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
- 01.09 Identify and describe typical automotive lubricants and lubricant properties.
- 01.10 Interpret the Florida 'Workers Right To Know Law'.
- 01.11 Identify and describe typical automotive seals and gaskets.
- 01.12 Identify and use the proper procedures required for cutting tubing and double and ISO flaring.
- 01.13 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
- 01.14 Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.
- 01.15 Describe and identify supplemental restraint systems (SRS).
- 01.16 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.

02.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

- 02.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 02.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 02.03 Construct charts/tables/graphs using functions and data. AF3.5

03.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0

- 03.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 03.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

- 04.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 04.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
  - 04.02 Locate, organize and reference written information from various sources. CM 3.0
  - 04.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
  - 04.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
  - 04.05 Apply active listening skills to obtain and clarify information. CM 7.0
  - 04.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
  - 04.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0
- 05.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry--  
The student will be able to:
- 05.01 Explain the effects of chemical/substance abuse.
  - 05.02 Identify principles of stress management.
  - 05.03 Identify and define career opportunities in the automotive service industry.
  - 05.04 Demonstrate acceptable industry dress code.
  - 05.05 Identify and demonstrate proper customer relations skills.
  - 05.06 Identify and define payroll deductions (taxes, insurance, social security) employee benefits and pay systems.
  - 05.07 Identify principles of time management.
  - 05.08 Identify acceptable customer relations.
- 06.0 Demonstrate proficiency in routine maintenance and consumer services (AKA Light Line AKA General Service Technician)--The student will be able to:
- 06.01 Inspect, test head lamps, tail lamps and stop lamps. Aim headlights.
  - 06.02 Perform oil and filter change.
  - 06.03 Service transmission; perform visual inspection; replace fluids and filters.
  - 06.04 Inspect engine assembly for fuel, oil, coolant, and other leaks.
  - 06.05 Inspect manual and power steering fluid levels and condition.
  - 06.06 Check rear axle drive assembly seals and vents; check lube level.
  - 06.07 Inspect and replace power steering hoses and fittings.
  - 06.08 Lubricate suspension and steering systems.
  - 06.09 Inspect, remove, and replace shock absorbers.
  - 06.10 Remove, inspect, and service front and rear wheel bearings on non-drive axles.
  - 06.11 Inspect tires, diagnose tire wear patterns. Check and adjust air pressure.
  - 06.12 Rotate tires according to manufacturer's recommendations, install wheels, torque lug nuts.
  - 06.13 Balance wheel and tire assembly (static and dynamic).
  - 06.14 Dismount, inspect, repair, and remount tire on wheel.
  - 06.15 Check master cylinder for internal and external leaks and proper operation.
  - 06.16 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
  - 06.17 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
  - 06.18 Select, handle, store, and install brake fluids to proper level.

- 06.19 Fill master cylinder with recommended fluid and seat pads.
- 06.20 Inspect, clean, fill, and replace battery.
- 06.21 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
- 06.22 Start a vehicle using jumper cables using a battery auxiliary power supply.
- 06.23 Perform slow/fast battery charge.
- 06.24 Observe dash warning lamps during bulb check.
- 06.25 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).
- 06.26 Practice recommended precautions when handling static sensitive devices.
- 06.27 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.
- 06.28 Perform product specific service procedures.
- 06.29 Reset product specific service indicator.
- 06.30 Demonstrate knowledge of manufacturer policies and procedures.
- 06.31 Identify product specific engine systems.
- 06.32 Identify product specific automatic transmission systems.
- 06.33 Identify product specific manual transmission systems.
- 06.34 Identify product specific electrical & electronic systems.
- 06.35 Identify product specific Heating & A/C systems.
- 06.36 Identify product specific steering & suspension systems.
- 06.37 Identify product specific brake systems.
- 06.38 Identify product specific audio systems.
- 06.39 Identify product specific safety systems.
- 06.40 Identify product specific accessories.
- 06.41 Use wiring diagrams of electrical circuit problems.
- 06.42 Check electrical circuits with a test light; determine necessary action.
- 06.43 Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).
- 06.44 Check current flow in electrical/electronic circuits and components using an ammeter.
- 06.45 Check electrical circuits using jumper wires.
- 06.46 Measure and diagnose the cause(s) of abnormal key-off battery drain.
- 06.47 Inspect and test fusible links, circuit breakers, and fuses; replace as needed.
- 06.48 Perform battery capacity (load, high-rate discharge) test; determine needed service.
- 06.49 Maintain or restore electronic memory functions.
- 06.50 Perform starter current draw and circuit voltage drop test; determine necessary action.
- 06.51 Remove and replace/reinstall starter.
- 06.52 Perform charging system test.
- 06.53 Remove, inspect, and replace/reinstall alternator.
- 06.54 Demonstrate retrieving stored diagnostic trouble codes.
- 06.55 Obtain and interpret digital multimeter (DMM) readings.
- 06.56 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
- 06.57 Replace fuel filters.
- 06.58 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.
- 06.59 Adjust valves on engines with mechanical lifters.
- 06.60 Remove and replace valve cover gaskets (ASE).
- 06.61 Return cores for rebuilt and exchange items.

- 06.62 Inspect passenger restraint system, repair if needed.
- 06.63 Maintain product specific engine systems.
- 06.64 Maintain product specific automatic transmission systems.
- 06.65 Maintain product specific manual transmission systems.
- 06.66 Maintain product specific electrical & electronic systems.
- 06.67 Maintain product specific Heating & A/C systems.
- 06.68 Maintain product specific steering & suspension systems.
- 06.69 Maintain product specific brake systems.
- 06.70 Maintain product specific audio systems.
- 06.71 Maintain product specific safety systems.
- 06.72 Maintain product specific accessories.

**Course Number: AER0319**

**Occupational Completion Point: B**

**Advanced Automotive Electrical/Electronic System Technician – 400 Hours – SOC Code 49-3023**

07.0 Demonstrate proficiency in diagnosing/troubleshooting electrical/electronic related components --The student will be able to:

- 07.01 Use wiring diagrams during diagnosis of electrical circuit problems.
- 07.02 Check electrical circuits with a test light; determine necessary action.
- 07.03 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine needed repairs.
- 07.04 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
- 07.05 Check electrical circuits using jumper wires; determine necessary action.
- 07.06 Find shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
- 07.07 Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action.
- 07.08 Inspect and test fusible links, circuit breakers, and fuses; replace as needed.
- 07.09 Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; repair or replace as needed.

**Battery Diagnosis and Service**

- 07.10 Perform battery state-of-charge test; determine needed service.
- 07.11 Perform battery capacity (load, high-rate discharge) test; determine needed service.
- 07.12 Maintain or restore electronic memory functions.
- 07.13 Inspect, clean, fill, and replace battery.
- 07.14 Perform slow/fast battery charge.
- 07.15 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
- 07.16 Start a vehicle using jumper cables and a battery or auxiliary power supply.

**Starting System Diagnosis and Repair**

- 07.17 Perform starter current draw and circuit voltage drop test; determine necessary action

- 07.18 Inspect and test starter relays and solenoids; replace as needed.
- 07.19 Remove and replace/reinstall starter.
- 07.20 Perform starter bench tests; determine necessary action.
- 07.21 Inspect, test, and repair or replace switches, connectors, and wires of starter control circuits.
- 07.22 Disassemble, clean, inspect, and test starter components; replace as needed.

### **Charging System Diagnosis and Repair**

- 07.23 Diagnose charging system problems that cause an undercharge, a no-charge or an overcharge condition.
- 07.24 Inspect and adjust alternator drive belts; replace as needed.
- 07.25 Inspect and test voltage regulator; replace as needed.
- 07.26 Remove, inspect, and replace/reinstall alternator.
- 07.27 Disassemble, clean, inspect, and test alternator components; replace as needed.
- 07.28 Perform charging circuit voltage drop tests; determine needed repairs.

### **Lighting Systems Diagnosis and Repair**

- 07.29 Diagnose brighter than normal, intermittent, dim or no light operation.
- 07.30 Inspect, replace, and aim headlights and bulbs.
- 07.31 Inspect and diagnose incorrect turn signal or hazard light operation; repair or replace as needed.

### **Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair**

- 07.32 Diagnose intermediate, high, low or no gauge readings.
- 07.33 Test gauge circuit voltage regulators (limiters); replace as needed.
- 07.34 Inspect and test gauges and gauge sending units; replace as needed.
- 07.35 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; repair or replace as needed.
- 07.36 Diagnose incorrect operation of warning devices and other driver information systems.
- 07.37 Diagnose intermediate, high, low or no readings on electronic instrument clusters.
- 07.38 Inspect and test sensors, sending units, connectors, and wires of electronic instrument circuits; repair or replace as needed.

### **Horn and Wiper/Washer Diagnosis and Repair**

- 07.39 Diagnose incorrect horn operation; repair as needed.
- 07.40 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; repair as needed.
- 07.41 Diagnose incorrect windshield washer operation; repair as needed.

### **Accessories Diagnosis and Repair**

- 07.42 Diagnose incorrect operation of motor-driven accessory circuits; repair as needed.
- 07.43 Diagnose incorrect heated glass operation; repair as needed.

- 07.44 Diagnose incorrect electric door and hatch/trunk lock operation; repair as needed.
- 07.45 Diagnose incorrect operation of cruise control systems; repair as needed.
- 07.46 Diagnose supplemental restraint system (SRS) problems; repair as needed. (NOTE: Follow manufacturer's safety procedures to prevent accidental deployment.)
- 07.47 Diagnose radio static and weak, intermittent, or no radio reception.
- 07.48 Achieve product specific certification requirements for electrical/electronic systems.
- 07.49 Service and repair product specific electrical/electronic systems.
- 07.50 Perform product specific diagnostic procedures.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Advanced Automotive Service Technology 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T600200
CIP Number	0647060414
Grade Level	30, 31
Standard Length	1600 Hours
Teacher Certification	AUTO IND @7 G AUTO MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 10.0 Reading: 10.0

### **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 a written business plan that establishes a partnership agreement between the educational institution and the automotive industry; competencies established by the Automotive Industry plus those included in the business plan and integration of academic requirements and training in communications, leadership, human relations, employability skills and safe, efficient work practices.



## Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0118	Advanced Engine Repair Technician	200	49-3023
B	AER0258	Advanced Automatic Transmission and Transaxle Technician	200	49-3023
C	AER0275	Advanced Manual Drivetrain and Axle Technician	200	49-3023
D	AER0459	Advanced Automotive Suspension and Steering Technician	200	49-3023
E	AER0419	Advanced Automotive Brake System Technician	200	49-3023
F	AER0173	Advanced Automotive Heating and Air Conditioning Technician	200	49-3023
G	AER0506	Advanced Automotive Engine Performance Technician	400	49-3023

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment and/or specialized training in the automotive industry. The program provides specialized corporate/association job preparatory training.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

All the NATEF tasks are assigned a priority number: P-1, P-2, or P-3. 95% of P-1 tasks will be performed; 80% of P-2 tasks; 50% of P-3 tasks. Please refer to the Task List Information in the NATEF Policies section for additional information on the requirements for instruction on tasks.

Theory instruction and hands-on performance of all the basic tasks will provide initial training for employment in the automotive service field or further training in any or all of the specialty areas. Competency in the tasks will indicate to employers that the graduate is skilled in that area.

Occupational Completion Points may be reached before the end of a program. All outcomes must be completed to receive credit for an Occupational Completion Point (OCP).

1. It is assumed that:
  - \* In all areas, appropriate theory, safety, and support instruction will be required for performing each task;
  - \* The instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
  - \* The student has received the necessary training to locate and use current reference and training materials from accepted industry publications.
  
2. It is assumed that:
  - \* All diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures as published.
  
3. It is assumed that:
  - \* Individual training programs being evaluated for certification should have written and detailed performance standards for each task covered and taught in the curriculum;
  - \* Learning progress of students will be monitored and evaluated against these performance standards;
  - \* A system is in place which informs all students of their individual progress through all phases of the training program.
  
4. It is assumed that:
  - \* Individual courses of study will differ across automobile technician training programs;
  - \* Development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.
  
5. It is assumed that:
  - \* All students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29 Code of Federal Regulation Part 1910.1200, "Right to Know Law";
  - \* Hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.

The program must be NATEF Master Certified and have a business plan approved by the appropriate industry affiliated organization. Instructors must be ASE Certified in all areas that they teach in addition to being certified in Engine Performance and Electrical/Electronic Systems. ASE Master Technician and Advanced Engine Performance (L1) ASE Certification is

preferred. Instructors must meet the specific product certification as specified in the business plan.

Program must meet the equipment and specialty tool requirement as specified in the business plan. Must offer Federally recognized refrigerant-recycling certification training.

The standard length of this program is 1600 hours. **Advanced Automotive Service Technology 1** is a core program. It is recommended students complete **Advanced Automotive Service Technology 1**, or demonstrate mastery of the outcomes in that program, prior to enrollment in **Advanced Automotive Service Technology 2**.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 10.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College

must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in engine theory and repairs.
- 02.0 Demonstrate language arts knowledge and skills
- 03.0 Solve problems using critical thinking skills, creativity and innovation.
- 04.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 05.0 Demonstrate proficiency in the operation and servicing of automatic transmission/trans-axle.
- 06.0 Use information technology tools
- 07.0 Describe the importance of professional ethics and legal responsibilities.
- 08.0 Demonstrate personal money-management concepts, procedures, and strategies
- 09.0 Demonstrate proficiency in the operation and servicing of manual drive trains and axles.
- 10.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 11.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 12.0 Explain the importance of employability and entrepreneurship skills
- 13.0 Demonstrate proficiency in the operation of steering and suspension systems.
- 14.0 Demonstrate proficiency in the operation and servicing of automotive brake systems.
- 15.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems.
- 16.0 Demonstrate proficiency in engine performance service.

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title:           Advanced Automotive Technology 2**  
**PSAV Number:           T600200**

**Course Number: AER0118**  
**Occupational Completion Point: A**  
**Advanced Engine Repair Technician – 200 Hours – SOC Code 49-3023**

01.0 Demonstrate proficiency in engine theory and repair--The student will be able to:

- 01.01 Service product specific engine systems.
- 01.02 Interpret and verify complaint; determine necessary action.
- 01.03 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 01.04 Listen to engine noises; determine necessary action.
- 01.05 Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.
- 01.06 Perform engine vacuum tests; determine necessary action.
- 01.07 Perform cylinder power balance tests; determine necessary action.
- 01.08 Perform cylinder compression tests; determine necessary action.
- 01.09 Perform cylinder leakage tests; determine necessary action.
- 01.10 Remove engine (front-wheel drive); prepare for disassembly.
- 01.11 Reinstall engine (front-wheel drive).
- 01.12 Remove engine (rear-wheel drive); prepare for disassembly.
- 01.13 Reinstall engine (rear-wheel drive).

**Cylinder Head and Valve Train Diagnosis and Repair**

- 01.14 Remove cylinder head(s); inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.
- 01.15 Install cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.
- 01.16 Inspect and test valve springs for squareness, pressure, and free height comparison; replace as needed.
- 01.17 Inspect valve spring retainers, locks, and valve grooves.
- 01.18 Replace valve stem seals.
- 01.19 Inspect valve guides for wear; check valve guide height and stem-to-guide clearance; recondition or replace as needed.
- 01.20 Inspect valves; resurface or replace.
- 01.21 Inspect valve seats; resurface or replace.
- 01.22 Check valve face-to-seat contact and valve seat concentricity (run out); service seats and valves as needed.
- 01.23 Check valve spring assembled height and valve stem height; service valve and spring assemblies as needed.
- 01.24 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); repair or replace.
- 01.25 Inspect hydraulic or mechanical lifters; replace as needed.
- 01.26 Adjust valves (mechanical or hydraulic lifters).

- 01.27 Inspect and replace camshaft drives (including gear wear and backlash, sprocket and chain wear, overhead cam drive sprockets, drive belts, belt tension, and tensioners).
- 01.28 Inspect camshaft for run out; measure journals and lobes for wear.
- 01.29 Inspect and measure camshaft bearings for wear, damage, out-of round, and alignment; determine necessary action.
- 01.30 Verify camshaft(s) timing according to manufacturer's specifications and procedure. P-2
- 01.31 Service product specific cam drive systems.
- 01.32 Perform product specific valve adjustments.

### **Engine Block Diagnosis and Repair**

- 01.33 Inspect and replace pans, covers, gaskets, and seals.
- 01.34 Inspect engine block for cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed repairs.
- 01.35 Inspect internal and external threads; repair as needed.
- 01.36 Remove cylinder wall ridges.
- 01.37 Inspect and measure cylinder walls for damage and wear; determine necessary action.
- 01.38 Deglaze and clean cylinder walls.
- 01.39 Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
- 01.40 Inspect crankshaft for surface cracks and journal damage; check oil passage condition; measure journal wear; determine necessary action.
- 01.41 Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selections of bearings).
- 01.42 Identify position and bearing wear patterns that include connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition.
- 01.43 Inspect, measure, service or replace pistons.
- 01.44 Inspect, measure, and install piston rings.
- 01.45 Inspect, repair or replace crankshaft vibration damper (harmonic balancer).
- 01.46 Inspect flywheel or flexplate and ring gear for cracks and wear; measure run out; determine necessary action.
- 01.47 Inspect, remove, and replace crankshaft pilot bearing or bushing (as applicable).
- 01.48 Reassemble engine components using correct gaskets and sealants.
- 01.49 Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.

### **Lubrication and Cooling Systems Diagnosis and Repairs**

- 01.50 Prime engine lubrication system.
- 01.51 Perform oil pressure tests; determine necessary action.
- 01.52 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; replace as needed.
- 01.53 Perform cooling system tests (pressure, combustion leakage, and temperature); determine necessary action.
- 01.54 Inspect, replace, and adjust drive belts and pulleys.

- 01.55 Inspect and replace engine cooling and heater system hoses.
  - 01.56 Inspect, test, and replace thermostat and housing.
  - 01.57 Inspect coolant; drain, flush, and refill cooling system with recommended coolant and bleed air as required.
  - 01.58 Inspect, test, remove, and replace water pump.
  - 01.59 Inspect and test radiator, pressure cap, and coolant recovery system; remove and replace radiator.
  - 01.60 Clean, inspect, and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
  - 01.61 Inspect and test electrical fan control system and circuits.
  - 01.62 Inspect auxiliary oil coolers; replace as needed.
  - 01.63 Inspect, test, and replace oil temperature and pressure switches and sensors.
  - 01.64 Perform oil and filter change.
  - 01.65 Service product specific water pumps.
  - 01.66 Service product specific belt drive & tensioner systems.
- 02.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 02.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
  - 02.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
  - 02.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 03.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 03.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
  - 03.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
  - 03.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
  - 03.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 04.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 04.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
  - 04.02 Explain emergency procedures to follow in response to workplace accidents.
  - 04.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: AER0258**  
**Occupational Completion Point: C**  
**Advanced Automatic Transmission and Transaxle Technician – 200 Hours – SOC Code 49-3023**

- 05.0 Demonstrate proficiency in the operation and servicing of automatic transmission/transaxle--The student will be able to:



- 05.01 Interpret and verify driver's complaint; verify proper engine operation; determine necessary action.
- 05.02 Diagnose unusual fluid usage, level, and condition problems; determine necessary action.
- 05.03 Perform pressure tests; determine necessary action.
- 05.04 Perform stall tests; determine necessary action.
- 05.05 Perform lock-up converter system tests; determine necessary action.
- 05.06 Diagnose electronic, mechanical, and vacuum control systems; determine necessary action.
- 05.07 Diagnose noise and vibration problems; determine necessary action.

### **Transmission and Transaxle Maintenance and Adjustment**

- 05.08 Inspect, adjust or replace manual shift valve and throttle (TV) linkages or cables and check gear select indicator (as applicable).
- 05.09 Service transmission; perform visual inspection; replace fluids and filters.

### **In-Vehicle Transmission and Transaxle Repair**

- 05.10 Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.
- 05.11 Inspect, repair, and replace governor assembly.
- 05.12 Inspect and replace external seals and gaskets.
- 05.13 Inspect extension housing; replace bushing and seals.
- 05.14 Inspect, leak test, flush, and replace cooler, lines, and fittings.
- 05.15 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 05.16 Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets); check/adjust valve body bolt torque.
- 05.17 Inspect servo bore, piston, seals, pin, spring, and retainers; repair or replace as needed.
- 05.18 Inspect accumulator bore, piston, seals, spring, and retainer; repair or replace as needed.
- 05.19 Inspect, test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses).
- 05.20 Inspect, replace, and align power train mounts.
- 05.21 Inspect and replace parking pawl, shaft, spring, and retainer.

### **Off-Vehicle Transmission and Transaxle Repair (Removal, Disassembly, and Reinstallation)**

- 05.22 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 05.23 Remove and reinstall transmission and torque converter (rear-wheel drive).
- 05.24 Disassemble, clean, and inspect transmission/transaxle.
- 05.25 Assemble transmission/transaxle.

### **Oil Pump and Converter**

- 05.26 Inspect converter flex plate, attaching parts, pilot and pump drive, and seal areas.
- 05.27 Measure torque converter end play and check for interference check stator clutch.
- 05.28 Inspect, measure, and replace oil pump housings, shafts, vanes, rotors, gears, valves, seals, and bushings.
- 05.29 Check torque converter and transmission cooling system for contamination.

### **Gear Train, Shafts, Bushings and Case**

- 05.30 Check end play or preload; determine needed service.
- 05.31 Inspect, measure, and replace thrust washers and bearings.
- 05.32 Inspect oil delivery seal rings, ring grooves, and sealing surface areas.
- 05.33 Inspect bushings; replace as needed.
- 05.34 Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); replace as needed.
- 05.35 Inspect cases, bores, passages, bushings, vents, and mating surfaces; replace as needed.
- 05.36 Inspect transaxle drive, link chains, sprockets, gears, bearings and bushings; replace as needed.
- 05.37 Inspect, measure, repair, adjust or replace transaxle final drive components.
- 05.38 Inspect and reinstall parking pawl, shaft, spring, and retainer; replace as needed.

### **Friction and Reaction Units**

- 05.39 Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; replace as needed.
- 05.40 Measure clutch pack clearance; adjust as needed.
- 05.41 Air test operation of clutch and servo assemblies.
- 05.42 Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed.
- 05.43 Inspect bands and drums; replace as needed. P-3
- 05.44 Achieve product specific certification requirements for automatic transmission systems.
- 05.45 Achieve product specific certification requirements for automatic transaxle systems.
- 05.46 Achieve product specific certification requirements for computer shifted transmission systems.

### **06.0 Use information technology tools. -- The students will be able to:**

- 06.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 06.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 06.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 06.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0

- 07.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 07.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
  - 07.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
  - 07.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
  - 07.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 08.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 08.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
  - 08.02 Describe the effect of money management on personal and career goals. FL 3.0
  - 08.03 Develop a personal budget and financial goals. FL3.1
  - 08.04 Complete financial instruments for making deposits and withdrawals. FL3.2
  - 08.05 Maintain financial records. FL3.3
  - 08.06 Read and reconcile financial statements. FL3.4
  - 08.07 Research, compare and contrast investment opportunities.

**Course Number: AER0275****Occupational Completion Point: D****Advanced Manual Drivetrain and Axle Technician – 200 Hours – SOC Code 49-3023**

- 09.0 Demonstrate proficiency in the operation and servicing of manual drive transmission/transaxle--The student will be able to:
- 09.01 Diagnose clutch noise, binding, slippage, pulsation, and chatter problems; determine necessary action.
  - 09.02 Inspect, adjust or replace clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs.
  - 09.03 Inspect, adjust, repair or replace hydraulic clutch slave master-cylinders, lines, and hoses.
  - 09.04 Inspect, adjust or replace release (throw-out) bearing, lever, and pivot.
  - 09.05 Inspect and replace clutch pressure plate assembly and clutch disc.
  - 09.06 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable).
  - 09.07 Inspect, repair, and service or replace flywheel and ring gear.
  - 09.08 Inspect engine block, clutch (bell) housing, and transmission case mating surface; determine necessary action.
  - 09.09 Measure flywheel-to-block run out and crankshaft end play; determine necessary action.
  - 09.10 Measure clutch (bell) housing bore-to-crankshaft run out and face squareness; determine needed service.

**Transmission Diagnosis and Repair**

- 09.11 Diagnose transmission noise, hard shifting, jumping out of gear, and fluid leakage problems; determine necessary action.

- 09.12 Inspect, adjust, and replace transmission shift linkages, brackets, bearings, cables, pivots, and levers.
- 09.13 Inspect, replace, and align power train mounts.
- 09.14 Inspect and replace transmission gaskets, seals, and sealants; Inspect sealing surfaces.
- 09.15 Remove and reinstall transmission.
- 09.16 Disassemble, clean, and reassemble transmission components.
- 09.17 Inspect, adjust, and reinstall transmission shift cover, forks, grommets, levers, shafts, sleeves, detent mechanisms, interlocks, and springs.
- 09.18 Inspect and reinstall input (clutch) shaft and bearings.
- 09.19 Inspect and reinstall main shaft, gears, thrust washers, bearings, and retainers.
- 09.20 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
- 09.21 Inspect and reinstall counter (cluster) gear, shaft, bearings, thrust washers, and retainers; check end play; adjust as needed.
- 09.22 Inspect and reinstall reverse idler gear, shaft, bearings, thrust washers, and retainers; check end play; adjust as needed.
- 09.23 Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 09.24 Inspect, repair, and replace extension housing and transmission case mating surfaces, bores, bushings, and vents.
- 09.25 Inspect lubrication devices (oil pump or slingers).
- 09.26 Achieve product specific certification for manual transmission systems.

### **Transaxle Diagnosis and Repair**

- 09.27 Diagnose transaxle noise, hard shifting, jumping out of gear, and fluid leakage problem; determine necessary action.
- 09.28 Inspect, adjust, and reinstall transaxle shift linkages, brackets, bushings, cables, pivots, and levers.
- 09.29 Inspect and reinstall power train mounts.
- 09.30 Remove and reinstall transaxle.
- 09.31 Inspect and replace transaxle gaskets, seals, and sealants; inspect sealing surfaces.
- 09.32 Remove and replace transaxle final drive.
- 09.33 Disassemble and clean transaxle final drive.
- 09.34 Inspect, adjust, and reinstall transaxle shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.
- 09.35 Inspect and reinstall input (clutch) shaft and bearings.
- 09.36 Inspect and reinstall output shaft, gears, thrust washers, bearings, and retainers.
- 09.37 Measure end play or preload (shim or spacer selection procedure) on transaxle shafts; adjust as needed.
- 09.38 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.
- 09.39 Inspect and reinstall reverse idler gear, shaft, bearings, thrust washers, and retainers.
- 09.40 Inspect transaxle case, mating surfaces, bores, bushings, and vents.
- 09.41 Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers.
- 09.42 Diagnose differential assembly noise and vibration problems; determine necessary action.

- 09.43 Remove, inspect, measure, adjust, and reinstall differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.
- 09.44 Inspect lubrication devices (oil pump or slingers).
- 09.45 Achieve product specific certification for manual transaxle systems.

### **Drive and Half Shaft Universal and Constant-Velocity (CV) Joint Diagnosis and Repair**

- 09.46 Diagnose constant-velocity (CV) joint noise and vibration problems; determine necessary action.
- 09.47 Diagnose universal joint noise and vibration problems; determine necessary action.
- 09.48 Diagnose front wheel drive (FWD) front wheel bearing noise and vibration problems; determine necessary action.
- 09.49 Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
- 09.50 Inspect, service, and replace shaft center support bearings.
- 09.51 Check and correct shaft balance; measure shaft run out; measure and adjust driveline angles.

### **Rear Axle Diagnosis and Repair; Ring and Pinion Gears and Differential Case Assembly**

- 09.52 Diagnose noise and vibration problems; determine necessary action.
- 09.53 Diagnose fluid leakage problems; determine necessary action.
- 09.54 Inspect and replace companion flange and pinion seal; measure companion flange run out.
- 09.55 Inspect ring gear and measure run out; determine necessary action.
- 09.56 Remove and inspect drive pinion gear, spacers, sleeves, and bearings.
- 09.57 Measure and adjust drive pinion depth.
- 09.58 Measure and adjust drive pinion bearing preload.
- 09.59 Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup and shim types).
- 09.60 Check ring and pinion tooth contact patterns; adjust as needed.
- 09.61 Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.
- 09.62 Reassemble and reinstall differential case assembly; measure run out; determine necessary action.
- 09.63 Achieve product specific certification for differentials.

### **Limited Slip Differential**

- 09.64 Diagnose noise, slippage, and chatter problems; determine necessary action.
- 09.65 Inspect and flush differential housing; refill with correct lubricant.
- 09.66 Inspect and reinstall clutch (cone or plate) components.
- 09.67 Measure rotating torque; determine necessary action

### **Axle Shaft**

- 09.68 Diagnose rear axle shafts, bearings, and seals for noise, vibration, and fluid leakage problems; determine necessary action.

- 09.69 Inspect and replace rear axle shaft wheel studs.
- 09.70 Remove and replace rear axle shafts.
- 09.71 Inspect and replace rear axle shaft seals, bearings, and retainers.
- 09.72 Measure rear axle flange run out and shaft end play; determine necessary action.

**Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair**

- 09.73 Diagnose noise, vibration, and unusual steering problems; determine necessary action.
- 09.74 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
- 09.75 Remove and reinstall transfer case.
- 09.76 Disassemble, service, and reassemble transfer case and components.
- 09.77 Inspect, service, and replace front-wheel bearings and locking hubs.
- 09.78 Check drive assembly seals and vents; check lube level.
- 09.79 Inspect viscous coupling assembly.
- 09.80 Achieve product specific certification for all wheel drive systems.

10.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:

- 10.01 Describe the nature and types of business organizations. SY 1.0
- 10.02 Explain the effect of key organizational systems on performance and quality.
- 10.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
- 10.04 Explain the impact of the global economy on business organizations.

11.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 11.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 11.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 11.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 11.04 Employ mentoring skills to inspire and teach others. LT 5.0

12.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 12.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 12.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 12.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 12.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 12.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 12.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 12.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 12.08 Research the benefits of ongoing professional development. ECD 9.0
- 12.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: AER0459**

**Occupational Completion Point: E**

**Advanced Automotive Suspension and Steering Technician – 200 Hours – SOC Code 49-3023**

- 13.0 Demonstrate proficiency in the operation of steering and suspension systems--The student will be able to:
- 13.01 Disable supplemental restraint system (SRS) in accordance with manufacturer's procedures.
  - 13.02 Diagnose steering column noises, looseness, and binding problems (including tilt mechanisms); determine necessary action.
  - 13.03 Diagnose power non-rack and pinion steering gear binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine necessary action.
  - 13.04 Diagnose power rack and pinion steering gear vibration, looseness, and hard steering problems; determine necessary action.
  - 13.05 Inspect and replace steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel.
  - 13.06 Adjust manual or power non-rack and pinion worm bearing preload and sector lash.
  - 13.07 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.
  - 13.08 Disassemble, inspect, repair, and reassemble rack and pinion steering gear.
  - 13.09 Adjust manual or power rack and pinion steering gear.
  - 13.10 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
  - 13.11 Inspect manual and power steering fluid levels and condition.
  - 13.12 Flush, fill, and bleed power steering system.
  - 13.13 Diagnose power steering fluid leakage; determine necessary action.
  - 13.14 Inspect, replace, and adjust power steering pump belt.
  - 13.15 Remove, inspect, and replace power steering pump, pump mounts, pump seals, and gaskets.
  - 13.16 Remove, inspect, and replace power steering pump pulley; check alignment.
  - 13.17 Perform power steering system pressure test; determine needed repairs.
  - 13.18 Inspect and replace power steering hoses and fittings.
  - 13.19 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
  - 13.20 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
  - 13.21 Diagnose, inspect, adjust, repair or replace components of electronically-controlled steering systems.
  - 13.22 Diagnose, inspect, repair or replace components of variable-assist steering systems.
  - 13.23 Achieve product specific certification for power assisted steering systems.
  - 13.24 Achieve product specific certification for variable assisted steering systems.

### **Suspension Systems Diagnosis and Repair; Front Suspensions**

- 13.25 Diagnose short and long arm suspension system noises, body sway, and uneven riding height problems; determine necessary action.

- 13.26 Diagnose MacPherson strut suspension system noises body sway, and uneven riding height problems; determine necessary action.
- 13.27 Remove, inspect, and replace upper and lower control arms, bushings, shafts, and rebound bumpers.
- 13.28 Remove, inspect, replace, and adjust strut (compression/tension) rods and bushings.
- 13.29 Remove, inspect, and replace upper and lower ball joints on short and long arm suspension systems.
- 13.30 Remove, inspect, and replace steering knuckle assemblies.
- 13.31 Remove, inspect, and replace short and long arm suspension system coil springs and spring insulators.
- 13.32 Remove, inspect, replace, and adjust suspension system torsion bars; inspect mounts.
- 13.33 Remove, inspect and replace stabilizer bar bushings, brackets, and links.
- 13.34 Remove, inspect and replace ball joints on MacPherson strut suspension systems.
- 13.35 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, insulators, and upper strut bearing mount.
- 13.36 Lubricate suspension and steering systems.
- 13.37 Service product specific suspension systems.

### **Rear Suspensions**

- 13.38 Remove, inspect, and replace coil springs and spring insulators.
- 13.39 Remove, inspect, and replace transverse links, control arms, bushings, and mounts.
- 13.40 Remove, inspect, and replace leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
- 13.41 Remove, inspect, and replace MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers).
- 13.42 Service product specific suspension systems.

### **Miscellaneous Service**

- 13.43 Inspect, remove, and replace shock absorbers.
- 13.44 Remove, inspect, and service or replace front and rear wheel bearings.
- 13.45 Diagnose, inspect, adjust, repair or replace components of electronically-controlled suspension systems.
- 13.46 Service product specific ride height control systems.

### **Wheel Alignment Diagnosis, Adjustment, and Repair**

- 13.47 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return problems; determine necessary action.
- 13.48 Measure vehicle riding height; determine necessary action.
- 13.49 Check and adjust front and rear wheel camber; determine needed repairs.
- 13.50 Check and adjust caster; determine necessary action.
- 13.51 Check and adjust front wheel toe; adjust as needed.
- 13.52 Center steering wheel.
- 13.53 Check toe-out-on-turns (turning radius); determine needed repairs.



- 13.54 Check SAI (steering axis inclination) and included angle; determine necessary action.
- 13.55 Check and adjust rear wheel toe.
- 13.56 Check rear wheel thrust angle; determine necessary action.
- 13.57 Check for front wheel setback; determine necessary action.
- 13.58 Check front cradle (subframe) alignment; determine needed repairs.

### **Wheel and Tire Diagnosis and Repair**

- 13.59 Diagnose tire wear patterns; determine necessary action.
- 13.60 Inspect tires; check and adjust air pressure.
- 13.61 Diagnose wheel/tire vibration, shimmy, and noise problems; determine necessary action.
- 13.62 Rotate tires according to manufacturer's recommendations.
- 13.63 Measure wheel, tire, axle, and hub run out; determine needed repairs.
- 13.64 Diagnose tire pull (lead) problem; determine corrective actions.
- 13.65 Balance wheel and tire assembly (static and dynamic).
- 13.66 Dismount, inspect, repair, and remount tire on wheel.
- 13.67 Reinstall wheel; torque lug nuts.

### **Course Number: AER0419**

### **Occupational Completion Point: F**

### **Advanced Automotive Brake System Technician – 200 Hours – SOC Code 49-3023**

- 14.0 Demonstrate proficiency in the operation and servicing of automotive brake system--The student will be able to:

- 14.01 Measure and adjust pedal pushrod length and pedal height.
- 14.02 Check master cylinder for internal and external leaks and proper operation; determine necessary action.
- 14.03 Remove, bench bleed, and replace master cylinder.
- 14.04 Diagnose poor stopping, pulling or dragging caused by problems in the hydraulic system; determine necessary action.
- 14.05 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.
- 14.06 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.
- 14.07 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.
- 14.08 Select, handle, store, and install brake fluids to proper level.
- 14.09 Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.
- 14.10 Inspect, test, replace, and adjust height (load) sensing proportioning valve.
- 14.11 Inspect, test, and replace components of brake warning light system.
- 14.12 Bleed (manual, pressure, vacuum or surge) brake system; flush hydraulic system.P-1

### **Drum Brake Diagnosis and Repair**

- 14.13 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation problems; determine necessary action.

- 14.14 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or replace as needed.
- 14.15 Mount brake drum on lathe machine braking surface.
- 14.16 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
- 14.17 Remove and reinstall wheel cylinders.
- 14.18 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.
- 14.19 Reinstall wheel, torque lug nuts, and make final checks and adjustments.

### **Disc Brake Diagnosis and Repair**

- 14.20 Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation caused problems; determine necessary action.
- 14.21 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing.
- 14.22 Clean and inspect caliper mounting and slides for wear and damage.
- 14.23 Remove, clean, and inspect pads and retaining hardware; determine needed service.
- 14.24 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.
- 14.25 Reassemble, lubricate, and reinstall caliper, pads, and related hardware.
- 14.26 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.
- 14.27 Refinish rotor according to manufacturer's recommendations.
- 14.28 Adjust calipers with integrated parking brake system.
- 14.29 Fill master cylinder with recommended fluid and seat pads; inspect caliper for leaks.
- 14.30 Reinstall wheel, torque lug nuts, and make final checks and adjustments.
- 14.31 Remove and replace rotor.

### **Power Assist Units Diagnosis and Repair**

- 14.32 Test pedal free travel with and without engine running; check power assist operation.
- 14.33 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
- 14.34 Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; repair or replace parts as needed.

### **Miscellaneous Diagnosis and Repair (Wheel Bearings, Parking Brakes, Electrical, Etc.)**

- 14.35 Diagnose wheel bearing noises, wheel shimmy, and vibration problems; determine necessary action.
- 14.36 Remove, clean, inspect, repack, and reinstall wheel bearings and replace seals; reinstall hub and adjust wheel bearings.
- 14.37 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed.
- 14.38 Check parking brake operation; adjust as needed.

- 14.39 Check operation of parking brake indicator light system.
- 14.40 Check operation of brake stop light system; adjust and service as needed.
- 14.41 Replace wheel bearing and race.

### **Anti-Lock Brake System**

- 14.42 Inspect, test, and service anti-lock brake system (ABS) hydraulic, electrical, and mechanical components.
- 14.43 Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise problems caused by the anti-lock brake system (ABS); determine necessary action.
- 14.44 Observe anti-lock brake system (ABS) warning light(s) at startup; determine if further diagnosis is needed.
- 14.45 Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.
- 14.46 Depressurize high pressure components of the anti-lock brake system (ABS) following manufacturer's recommended safety procedures.
- 14.47 Fill the anti-lock brake system (ABS) master cylinder with recommended fluid following manufacturer's procedures; inspect system for leaks.
- 14.48 Bleed the anti-lock brake system's (ABS) front and rear hydraulic circuits following manufacturer's procedures.
- 14.49 Perform a fluid pressure (hydraulic boost) diagnosis on the high pressure anti-lock brake system (ABS); determine necessary action.
- 14.50 Remove and install anti-lock brake system (ABS) electrical/electronic/hydraulic components following manufacturer's procedures and specifications.
- 14.51 Service, test, and adjust anti-lock brake system (ABS) speed sensors following manufacturer's recommended procedures.
- 14.52 Diagnose anti-lock brake system (ABS) braking problems caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).
- 14.53 Achieve product specific certification requirements for anti-lock brake systems.
- 14.54 Service product specific anti-lock brake systems
- 14.55 Service product specific traction control systems.

**Course Number: AER0173**

**Occupational Completion Point: F**

**Advanced Automotive Heating and Air Conditioning Technician – 200 Hours – SOC Code 49-3023**

- 15.0 Demonstrate proficiency in heating, air conditioning and engine cooling systems--The student will be able to:
  - 15.01 Diagnose unusual operating noises in the A/C system; determine necessary action.
  - 15.02 Conduct a performance test of the A/C system; determine needed repairs.
  - 15.03 Leak test a/c system; determine necessary action.
  - 15.04 Inspect the condition of discharged oil.
  - 15.05 Select oil type; measure and add oil to the A/C system as needed.

### **Refrigeration System Component Diagnosis and Repair Compressor and Clutch**

- 15.06 Diagnose A/C system problems that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
- 15.07 Inspect A/C compressor drive belts; replace and adjust as needed.
- 15.08 Inspect, test, and replace A/C compressor clutch components or assembly.
- 15.09 Remove and replace A/C compressor and mountings.
- 15.10 Inspect and replace A/C compressor shaft seal assembly(ies).

#### **Evaporator, Receiver/Drier, Condenser, Etc.**

- 15.11 Diagnose A/C system problems caused by too much moisture in the refrigerant; determine necessary action.
- 15.12 Install A/C system filter.
- 15.13 Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; replace as needed.
- 15.14 Inspect A/C condenser for air flow restrictions; service as required.
- 15.15 Inspect receiver/drier or accumulator/drier; replace as needed.
- 15.16 Inspect and test expansion valve or orifice (expansion) tube; replace as needed.
- 15.17 Inspect evaporator housing water drain; repair as needed.

#### **Heating and Engine Cooling Systems Diagnosis And Repair**

- 15.18 Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
- 15.19 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.
- 15.20 Inspect engine cooling and heater system hoses and belts; replace as needed.
- 15.21 Inspect, test, and replace thermostat and housing.
- 15.22 Determine coolant condition; drain and recover.
- 15.23 Flush system and refill with recommended coolant; bleed system.
- 15.24 Clean, inspect, and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; replace as needed.
- 15.25 Inspect and test heater control valve(s); replace as needed.

#### **Operating Systems and Related Controls Diagnosis and Repairs**

- 15.26 Diagnose failures in the electrical controls of heating and A/C systems; determine necessary action.
- 15.27 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; repair as needed.
- 15.28 Test A/C compressor load cut-off systems; determine needed repairs.

#### **Vacuum/Mechanical**

- 15.29 Diagnose failure in the vacuum and mechanical controls of the heating and A/C system; determine necessary action.
- 15.30 Inspect and test A/C-heater control panel assembly; replace as needed.
- 15.31 Inspect and test A/C-heater control cables and linkages adjust or replace as needed.
- 15.32 Inspect and test A/C-heater vacuum control switches, hoses, diaphragms (motor), vacuum reservoir, check valve, and restrictors; replace as needed.

- 15.33 Inspect and test A/C-heater ducts, doors, hoses, and outlets; replace as needed.

### **Automatic and Semi-Automatic Temperature Controls**

- 15.34 Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

### **Refrigerant Recovery, Recycling, And Handling**

- 15.35 Verify correct operation and maintenance of refrigerant handling equipment.
- 15.36 Identify and recover A/C system refrigerant.
- 15.37 Recycle refrigerant.
- 15.38 Label and store refrigerant.
- 15.39 Test recycled refrigerant for non-condensable gases.
- 15.40 Evaluate and charge A/C system.
- 15.41 Achieve product specific certification requirements for climate control systems.
- 15.42 Service product specific climate control systems.

**Course Number: AER0506**

**Occupational Completion Point: G**

**Advanced Automotive Engine Performance Technician – 400 Hours – SOC Code 49-3023**

- 16.0 Demonstrate proficiency in engine performance service --The student will be able to:

- 16.01 Interpret and verify complaint; determine necessary action.
- 16.02 Demonstrate proficiency in use of computer-based information systems.
- 16.03 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
- 16.04 Diagnose unusual engine noise or vibration problems; determine necessary action.
- 16.05 Diagnose unusual exhaust color, odor, and sound; determine needed action.
- 16.06 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- 16.07 Perform cylinder power balance test; determine needed action.
- 16.08 Perform cylinder compression test; determine needed action.
- 16.09 Perform cylinder leakage test; determine needed action.
- 16.10 Diagnose engine mechanical, electrical, electronic, fuel, and ignition problems with an oscilloscope and engine diagnostic equipment; determine needed action.
- 16.11 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret readings and determine needed action.

### **Computerized Engine Controls Diagnosis and Repair**

- 16.12 Diagnose emissions or driveability problems resulting from of computerized engine controls with no diagnostic trouble codes stored; determine necessary action.
- 16.13 Retrieve and record stored diagnostic trouble codes.
- 16.14 Diagnose the causes of emissions or driveability problems resulting from failure of computerized engine controls with stored diagnostic trouble codes.
- 16.15 Inspect, test, adjust, and replace computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits.
- 16.16 Obtain and interpret digital multimeter (DMM) readings.
- 16.17 Access and use electronic service information (ESI).

- 16.18 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).
- 16.19 Inspect and test power and ground circuits and connections; service or replace as needed.
- 16.20 Practice recommended precautions when handling static sensitive devices.
- 16.21 Diagnose driveability and emissions problems resulting from failures of interrelated systems (cruise control, security alarms, torque controls, suspension controls, traction controls, torque management, A/C, automatic transmissions, and similar systems); determine necessary action.
- 16.22 Achieve product specific certification requirements for diagnostic scanner.
- 16.23 Achieve product specific certification requirements for PROM reprogramming systems.
- 16.24 Perform product specific OBD II drive cycle diagnostic tests.

### **Ignition System Diagnosis and Repair**

- 16.25 Diagnose no-starting, driveability, and emissions problems on vehicles with electronic ignition (distributorless) systems; determine necessary action.
- 16.26 Diagnose no-starting, driveability, and emissions problems on vehicles with distributor ignition (DI) systems; determine needed repairs.
- 16.27 Inspect and test ignition primary circuit wiring and components; repair or replace as needed.
- 16.28 Inspect and test distributor; service as needed.
- 16.29 Inspect and test ignition system secondary circuit wiring and components; replace as needed.
- 16.30 Inspect and test ignition coil(s); replace as needed.
- 16.31 Check and adjust (where applicable) ignition system timing and timing advance/retard.
- 16.32 Inspect and test ignition wiring harness and connectors; replace as needed.
- 16.33 Inspect and test ignition system pick-up sensor or triggering devices; replace as needed.
- 16.34 Inspect and test ignition control module; replace as needed.
- 16.35 Achieve product specific certification requirements for specific ignition systems.
- 16.36 Service product specific ignition systems.

### **Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair**

- 16.37 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine needed action.
- 16.38 Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine needed action.
- 16.39 Inspect fuel tank and fuel cap; inspect and replace fuel lines, fittings, and hoses.
- 16.40 Check fuel for contaminants and quality.
- 16.41 Inspect and test mechanical and electrical fuel pumps and pump control systems; replace as needed.
- 16.42 Replace fuel filters.
- 16.43 Inspect and test fuel pressure regulation system and components.

- 16.44 Inspect and test cold enrichment system components; adjust or replace as needed.
- 16.45 Remove, clean, and reinstall throttle body; adjust related linkages
- 16.46 Inspect and test fuel injectors; clean and replace.
- 16.47 Inspect throttle body mounting plates, air induction and filtration system, intake manifold, and gaskets; clean or replace as needed.
- 16.48 Check/adjust idle speed and fuel mixture where applicable.
- 16.49 Remove, inspect, and test vacuum and electrical components and connections of fuel system; repair or replace as needed.
- 16.50 Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.
- 16.51 Perform exhaust system back-pressure test; determine needed action.
- 16.52 Test the operation of turbocharger/supercharger systems; determine needed action
- 16.53 Remove, clean, inspect, and repair or replace turbocharger/supercharger system components.
- 16.54 Identify the causes of turbocharger/supercharger failure; determine needed action.
- 16.55 Achieve product specific certification requirements for fuel injection systems.
- 16.56 Service product specific fuel injection systems.

### **Emissions Control Systems Diagnosis and Repair Positive Crankcase Ventilation**

- 16.57 Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system.
- 16.58 Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.

### **Exhaust Gas Recirculation**

- 16.59 Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system.
- 16.60 Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; service or replace as needed.
- 16.61 Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; service or replace as needed.
- 16.62 Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; repair or replace as needed.

### **Exhaust Gas Treatment**

- 16.63 Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems.
- 16.64 Inspect and test mechanical components of secondary air injection systems; service or replace as needed.
- 16.65 Inspect and test electrical/electronically-operated components and circuits of air injection systems; replace as needed.
- 16.66 Inspect and test components of catalytic converter systems; replace as needed.

### **Intake Air Temperature Controls**

- 16.67 Diagnose emissions and driveability problems resulting from failure of the intake air temperature control systems.

- 16.68 Inspect and test components of intake air temperature control systems; replace as needed.

### **Early Fuel Evaporation (Intake Manifold Temperature) Controls**

- 16.69 Diagnose emissions and driveability problems resulting from failure of early fuel evaporation control systems.
- 16.70 Inspect and test components of early fuel evaporation control systems; service or replace as needed.

### **Evaporative Emissions Controls**

- 16.71 Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system.
- 16.72 Inspect and test components and hoses of evaporative emissions control system; replace as needed.

### **Engine Related Service**

- 16.73 Adjust valves on engines with mechanical or hydraulic lifters
- 16.74 Verify correct camshaft timing; determine needed action.
- 16.75 Verify engine operating temperature; determine needed action.
- 16.76 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; service or replace as needed.
- 16.77 Inspect and test thermostat, by-pass, and housing; replace as needed.
- 16.78 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; service or replace as needed.



2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Avionics 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T640100
CIP Number	0647.060900
Grade Level	30, 31
Standard Length	1400 hours
Teacher Certification	AVIONICS @7 G ELECTRONIC @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2091
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 10.0 Reading: 10.0

### **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, troubleshooting, repair and installation of airborne radio communications, radio navigation and radar equipment systems in accordance with regulatory and industry standards. Also included is instruction in basics of AM and FM transmitters and receivers and avionics equipment. Skills preparation for passing licensing/certification tests required by industry forms an integral part of the curriculum.

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

### **Program Structure**

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0010	Electronics Assembler	250	49-2091
B	EEV0100	Electronics Tester	400	49-2091
C	EEV0500	Electronics Equipment Repairer	375	49-2091
D	EEV0616	Electronics Technician	375	49-2091

### **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### **Special Notes**

The purpose of this program is to prepare students for employment as radio mechanics and as avionics technicians.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Avionics industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Electronic Technology and/or Electronic Engineering Technology and/or equipment training and/or work experience are prerequisites for entry into this electronic specialization. Algebra is recommended as a prerequisite for entry into this program.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 10.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in soldering and basic laboratory practices.
- 02.0 Demonstrate proficiency in basic D.C. circuits.
- 03.0 Demonstrate mathematics knowledge and skills.
- 04.0 Demonstrate science knowledge and skills
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 06.0 Demonstrate proficiency in advanced D.C. circuits.
- 07.0 Demonstrate proficiency in A.C. circuits.
- 08.0 Demonstrate proficiency in solid state devices.
- 09.0 Demonstrate language arts knowledge and skills
- 10.0 Solve problems using critical thinking skills, creativity and innovation.
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 12.0 Demonstrate proficiency in digital circuits.
- 13.0 Demonstrate proficiency in fundamental micro-processors.
- 14.0 Use information technology tools
- 15.0 Describe the importance of professional ethics and legal responsibilities.

- 16.0 Demonstrate personal money-management concepts, procedures, and strategies
- 17.0 Demonstrate proficiency in analog circuits.
- 18.0 Demonstrate skills in technical recording.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Avionics 1**  
**PSAV Number: T640100**

**Course Number: EEV0010**  
**Occupational Completion Point: A**  
**Electronics Assembler – 250 Hours – SOC Code 49-2091**

- 01.0 Demonstrate proficiency in soldering basic laboratory practices--The student will be able to:
- 01.01 Apply proper Occupational Safety Health Administration (OSHA) safety standards.
  - 01.02 Make electrical connections.
  - 01.03 Identify and use hand tools properly.
  - 01.04 Identify and use power tools properly.
  - 01.05 Demonstrate acceptable soldering techniques.
  - 01.06 Demonstrate acceptable desoldering techniques.
  - 01.07 Demonstrate electrostatic discharge (ESD) safety procedures.
  - 01.08 Describe the construction of printed circuit boards (PCB's).
  - 01.09 Explain the theoretical concepts of soldering.
  - 01.10 Demonstrate rework and repair techniques.
- 02.0 Demonstrate proficiency in basic direct current (DC) circuits--The student will be able to:
- 02.01 Demonstrate proficiency in basic D.C. circuits.
  - 02.02 Solve problems in electronic units utilizing metric prefixes.
  - 02.03 Identify sources of electricity.
  - 02.04 Define voltage, current, resistance, power and energy.
  - 02.05 Apply Ohm's law and power formulas.
  - 02.06 Read and interpret color codes and symbols to identify electrical components and values.
  - 02.07 Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) and oscilloscopes.
  - 02.08 Compute conductance and compute and measure resistance of conductors and insulators.
  - 02.09 Apply Ohm's law to series circuits.
  - 02.10 Construct and verify operation of series circuits.
  - 02.11 Analyze and troubleshoot series circuits.
  - 02.12 Apply Ohm's law to parallel circuits.
  - 02.13 Construct and verify the operation of parallel circuits.
  - 02.14 Analyze and troubleshoot parallel circuits.
- 03.0 Demonstrate mathematics knowledge and skills. -- The students will be able to:
- 03.01 Demonstrate knowledge of arithmetic operations. AF3.0
  - 03.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.2
  - AF3.4

- 03.03 Construct charts/tables/graphs using functions and data. AF3.5
- 04.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0
- 04.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 04.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3
- 05.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:
- 05.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 05.02 Locate, organize and reference written information from various sources. CM 3.0
- 05.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 05.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 05.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 05.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 05.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: EEV0100**  
**Occupational Completion Point: B**  
**Electronics Tester – 400 Hours – SOC Code 49-2091**

- 06.0 Demonstrate proficiency in D.C. circuits--The student will be able to:
- 06.01 Solve algebraic problems to include exponentials to DC.
- 06.02 Relate electricity to the nature of matter.
- 06.03 Apply Ohm's law to series-parallel and parallel-series circuits.
- 06.04 Construct and verify the operation of series-parallel and parallel-series and bridge circuits.
- 06.05 Troubleshoot series-parallel and parallel-series and bridge circuits.
- 06.06 Identify and define voltage divider circuits (loaded and unloaded).
- 06.07 Construct and verify the operation of voltage divider circuits (loaded and unloaded).
- 06.08 Analyze and troubleshoot voltage divider circuits (loaded and unloaded).
- 06.09 Apply maximum power transfer theorem.
- 06.10 Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.
- 06.11 Describe magnetic properties of circuits and devices.
- 06.12 Determine the physical and electrical characteristics of capacitors and inductors.
- 06.13 Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.
- 06.14 Set up and operate power supplies for DC circuits.
- 07.0 Demonstrate proficiency in A.C. circuits--The student will be able to:
- 07.01 Solve basic trigonometric problem as applicable to electronics.

- 07.02 Define the characteristics of AC capacitive circuits.
  - 07.03 Construct and verify the operation of AC capacitive circuits.
  - 07.04 Analyze and troubleshoot AC capacitive circuits.
  - 07.05 Define the characteristics of AC inductive circuits.
  - 07.06 Construct and verify the operation of AC inductive circuits.
  - 07.07 Analyze and troubleshoot AC inductive circuits.
  - 07.08 Define and apply the principles of transformers to AC circuits.
  - 07.09 Construct and verify the operation of AC circuits utilizing transformers.
  - 07.10 Analyze and troubleshoot AC circuits utilizing transformers.
  - 07.11 Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.
  - 07.12 Analyze and troubleshoot differentiator and integrator circuits.
  - 07.13 Define the characteristics of resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).
  - 07.14 Construct and verify the operation of series and parallel resonant circuits.
  - 07.15 Define the characteristics of series and parallel resonant circuits.
  - 07.16 Construct and verify the operation of series and parallel resonant circuits.
  - 07.17 Analyze and troubleshoot R-C, R-L, and RLC circuits.
  - 07.18 Define the characteristics of frequency selective filter circuits.
  - 07.19 Construct and verify the operation of frequency selective filter circuits.
  - 07.20 Analyze and troubleshoot frequency selective filter circuits.
  - 07.21 Define the characteristics of polyphase circuits.
  - 07.22 Define basic motor theory and operation.
  - 07.23 Define basic generator theory and operation.
  - 07.24 Set up and operate power supplies for AC circuits.
  - 07.25 Analyze and measure power in AC circuits.
  - 07.26 Set up and operate capacitor and inductor analyzers for AC circuits.
- 08.0 Demonstrate proficiency in solid state devices--The student will be able to:
- 08.01 Identify and define properties of semiconductor materials.
  - 08.02 Identify and define operating characteristics and applications of junction diodes.
  - 08.03 Identify and define operating characteristics and applications of special diodes.
  - 08.04 Construct diode circuits.
  - 08.05 Analyze and troubleshoot diode circuits.
  - 08.06 Identify and define operating characteristics and applications of bipolar transistors,
  - 08.07 Identify and define operating characteristics and applications of field effect transistors.
  - 08.08 Identify and define operating characteristics and applications of single-stage amplifiers.
  - 08.09 Construct single-stage amplifiers.
  - 08.10 Analyze and troubleshoot single-stage amplifiers.
  - 08.11 Construct thyristor circuitry.
  - 08.12 Analyze and troubleshoot thyristor circuitry.
  - 08.13 Set up and operate VOM for solid-state devices.
  - 08.14 Set up and operate DVM for solid-state devices.
  - 08.15 Set up and operate power supplies for solid-state devices.
  - 08.16 Set up and operate oscilloscopes for solid-state devices.
  - 08.17 Set up and operate function generators for solid-state devices.
  - 08.18 Set up and operate capacitor and inductor analyzers for solid-state devices.



- 08.19 Set up and operate curve tracers.
- 08.20 Set up and operate transistor testers.
- 09.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0
- 09.01 Locate, comprehend and evaluate key elements of oral and written information.AF2.4
- 09.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 09.03 Present information formally and informally for specific purposes and audiences.AF2.9
- 10.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 10.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 10.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 10.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 10.04 Conduct technical research to gather information necessary for decision-making.PS 4.0
- 11.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 11.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 11.02 Explain emergency procedures to follow in response to workplace accidents.
- 11.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: EEV0500****Occupational Completion Point: C****Electronics Equipment Repairer – 375 Hours – SOC Code 49-2091**

- 12.0 Demonstrate proficiency in digital circuits--The student will be able to:
- 12.01 Define and apply numbering systems to codes and arithmetic operations.
- 12.02 Analyze and minimize logic circuits using Boolean operations.
- 12.03 Set up and operate logic probes for digital circuits.
- 12.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.
- 12.05 Set up and operate pulsers for digital circuits.
- 12.06 Set up and operate oscilloscopes for digital circuits.
- 12.07 Set up and operate logic analyzers for digital circuits.
- 12.08 Set up and operate pulse generators for digital circuits.
- 12.09 Identify types of logic gates and their truth tables.
- 12.10 Construct combinational logic circuits using integrated circuits.
- 12.11 Troubleshoot logic circuits.
- 12.12 Analyze types of flip-flops and their truth tables.
- 12.13 Construct flip-flops using integrated circuits.
- 12.14 Troubleshoot flip-flops.

- 12.15 Identify, define and measure characteristics of integrated circuit (IC) logic families.
  - 12.16 Identify types of registers and counters.
  - 12.17 Construct registers and counters using flip-flops and logic gates.
  - 12.18 Troubleshoot registers and counters.
  - 12.19 Analyze clock and timing circuits.
  - 12.20 Construct clock and timing circuits.
  - 12.21 Troubleshoot clock and timing circuits.
  - 12.22 Identify types of arithmetic-logic circuits.
  - 12.23 Construct arithmetic-logic circuits.
  - 12.24 Troubleshoot arithmetic-logic circuits.
  - 12.25 Identify types of encoding and decoding devices.
  - 12.26 Construct encoders and decoders.
  - 12.27 Troubleshoot encoders and decoders.
  - 12.28 Identify types of multiplexer and demultiplexer circuits.
  - 12.29 Construct multiplexer and demultiplexer circuits using integrated circuits.
  - 12.30 Troubleshoot multiplexer and demultiplexer circuits.
  - 12.31 Identify types of memory circuits.
  - 12.32 Relate the uses of digital-to-analog and analog-to-digital conversions.
  - 12.33 Construct digital-to-analog and analog-to-digital circuits.
  - 12.34 Troubleshoot digital-to-analog and analog-to-digital circuits.
  - 12.35 Identify types of digital displays.
  - 12.36 Construct digital display circuits.
  - 12.37 Troubleshoot digital display circuits.
- 13.0 Demonstrate proficiency in fundamental micro processors--The student will be able to:
- 13.01 Identify central processing unit (CPU) building blocks and their uses (architecture).
  - 13.02 Analyze bus concepts.
  - 13.03 Analyze various memory schemes.
  - 13.04 Use memory devices in circuits.
  - 13.05 Troubleshoot memory device circuits.
  - 13.06 Set up and operate oscilloscopes for microprocessor systems.
  - 13.07 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.
  - 13.08 Identify types of input and output devices and peripherals.
  - 13.09 Interface input and output ports to peripherals.
  - 13.10 Analyze and troubleshoot input and output ports.
  - 13.11 Write a macro processor program in assembly language.
  - 13.12 Write a macro processor program in machine language.
  - 13.13 Execute micro processor instruction sets.
- 14.0 Use information technology tools. -- The students will be able to:
- 14.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
  - 14.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
  - 14.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0

- 14.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 15.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 15.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 15.02 Evaluate alternative responses to workplace situations based on personal, a. professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 15.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 15.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 16.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 16.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 16.02 Describe the effect of money management on personal and career goals. FL 3.0
- 16.03 Develop a personal budget and financial goals. FL3.1
- 16.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 16.05 Maintain financial records. FL3.3
- 16.06 Read and reconcile financial statements. FL3.4
- 16.07 Research, compare and contrast investment opportunities.

**Course Number: EEV0616****Occupational Completion Point: D****Electronics Technician – 375 Hours – SOC Code 49-2091**

- 17.0 Demonstrate proficiency in analog circuits--The student will be able to:
- 17.01 Identify and define operational characteristics and applications of multistage amplifiers.
- 17.02 Construct multistage amplifiers.
- 17.03 Analyze and troubleshoot multistage amplifiers.
- 17.04 Identify and define operating characteristics and applications of linear integrated circuits.
- 17.05 Identify and define operating characteristics and applications of basic power supplies and filters.
- 17.06 Construct basic power supplies and filters.
- 17.07 Identify and define operating characteristics and applications of differential and operational amplifiers.
- 17.08 Construct differential and operational amplifier circuits.
- 17.09 Analyze and troubleshoot differential and operational amplifier circuits.
- 17.10 Identify and define operating characteristics of audio power amplifiers.
- 17.11 Construct audio power amplifiers.
- 17.12 Construct audio power amplifiers.
- 17.13 Analyze and troubleshoot audio power amplifiers.
- 17.14 Identify and define operating characteristics and applications of power supply regulator circuits.
- 17.15 Construct power supply regulator circuits.
- 17.16 Analyze and troubleshoot power supply regulator circuits.

- 17.17 Identify and define operating characteristics and applications of active filters.
  - 17.18 Construct active filter circuits.
  - 17.19 Analyze and troubleshoot active filter circuits.
  - 17.20 Identify and define operating characteristics and applications of sinusoidal and nonsinusoidal oscillator circuits.
  - 17.21 Construct oscillator circuits.
  - 17.22 Analyze and troubleshoot oscillator circuits.
  - 17.23 Identify and define operating characteristics and applications of cathode ray tubes.
  - 17.24 Identify and define operating characteristics and applications of optoelectronic devices.
  - 17.25 Set up and operate measuring instruments for analog circuits.
- 18.0 Demonstrate skills in technical recording--The student will be able to:
- 18.01 Draw and interpret electronic schematics.
  - 18.02 Record data and design curves and graphs.
  - 18.03 Write reports and make oral presentations.
  - 18.04 Maintain test logs.
  - 18.05 Make equipment failure reports.
  - 18.06 Specify and requisition simple electronic components.
  - 18.07 Compose technical letters and memoranda.
  - 18.08 Write formal reports of laboratory experiences.
  - 18.09 Draft preventive maintenance and calibration procedures.
- 19.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 19.01 Describe the nature and types of business organizations. SY 1.0
  - 19.02 Explain the effect of key organizational systems on performance and quality.
  - 19.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 19.04 Explain the impact of the global economy on business organizations.

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Avionics 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T640200
CIP Number	0647060901
Grade Level	30, 31
Standard Length	720 hours
Teacher Certification	AVIONICS @7 G ELECTRONIC @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2091
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 10.0 Language: 10.0 Reading: 10.0

### **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 troubleshooting, repair and installation of airborne radio communications, radio navigation and radar equipment systems in accordance with regulatory and industry standards. Also included is instruction in basics of AM and FM transmitters and receivers and avionics equipment. Skills preparation for passing licensing/certification tests required by industry forms an integral part of the curriculum.

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

### Program Structure

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

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AVS0090	Avionics Technical Publications Technician	180	49-2091
B	AVS0091	Avionics Installer	180	49-2091
C	AVS0092	Avionics Communication System Technician	180	49-2091
D	AVS0093	Avionics Technician	180	49-2091

### Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

### Special Notes

The purpose of this program is to prepare students for employment as radio mechanics and as avionics technicians.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Avionics industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

Electronic Technology and/or Electronic Engineering Technology and/or equipment training and/or work experience are prerequisites for entry into this electronic specialization. Algebra is recommended as a prerequisite for entry into this program.

The standard length of this program is 720 hours. **Avionics 1** is a core program. It is recommended students complete **Avionics 1**, or demonstrate mastery of the outcomes in that program, prior to enrollment in **Avionics 2**.

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website ([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 10.0, Language 10.0, and Reading 10.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications (<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's

accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Demonstrate proficiency in AM and FM transmitters.
- 02.0 Demonstrate proficiency in AM and FM receivers.
- 03.0 Demonstrate proficiency in AM and FM transceivers.
- 04.0 Demonstrate proficiency in electromagnetic wave emissions.
- 05.0 Demonstrate proficiency in avionics radio repair station regulations and procedures.
- 06.0 Demonstrate proficiency in aircraft electrical systems and ground safety.
- 07.0 Demonstrate proficiency in line and bench maintenance of airborne communication systems.
- 08.0 Demonstrate proficiency in line and bench maintenance of airborne radio navigation systems and equipment.
- 09.0 Demonstrate proficiency in line and bench maintenance of airborne radar systems.



- 10.0 Demonstrate proficiency in the principles of operation of area navigation (R-NAV) systems.
- 11.0 Demonstrate proficiency in installing avionics systems.
- 12.0 Demonstrate proficiency in the calibration of test equipment.
- 13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 14.0 Explain the importance of employability and entrepreneurship skills

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Avionics 2**  
**PSAV Number: T640200**

**Course Number: AVS0090**  
**Occupational Completion Point: A**  
**Avionics Technical Publications Technician – 180 Hours – SOC Code 49-2091**

05.0 Demonstrate proficiency in avionics radio repair station regulations and procedures--The student will be able to:

- 05.01 Define repair station related regulatory and standardization agencies and their purposes.
- 05.02 Define repair station certification requirements.
- 05.03 Define requirements for certification of radio repairmen.
- 05.04 Practice proper station operation procedures.
- 05.05 Prepare repair station reports and documentation.

13.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:

- 13.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
- 13.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
- 13.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
- 13.04 Employ mentoring skills to inspire and teach others. LT 5.0

14.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:

- 14.01 Identify and demonstrate positive work behaviors needed to be employable. ECD 1.0
- 14.02 Develop personal career plan that includes goals, objectives, and strategies. ECD 2.0
- 14.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
- 14.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
- 14.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
- 14.06 Identify and exhibit traits for retaining employment. ECD 7.0
- 14.07 Identify opportunities and research requirements for career advancement. ECD 8.0
- 14.08 Research the benefits of ongoing professional development. ECD 9.0
- 14.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

**Course Number: AVS0091**  
**Occupational Completion Point: B**  
**Avionics Installer – 180 Hours – SOC Code 49-2091**

06.0 Demonstrate proficiency in aircraft electrical systems and ground safety--The student will be able to:

- 06.01 Define standard aircraft bus voltage.
  - 06.02 Analyze aircraft electrical power generation and charging systems.
  - 06.03 Analyze aircraft electrical power control and distribution systems.
  - 06.04 Analyze aircraft electrical warning systems.
  - 06.05 Analyze aircraft ground handling safety.
  - 06.06 Describe and practice aircraft ground handling safety procedures pertaining to avionics maintenance.
- 07.0 Demonstrate proficiency in line and bench maintenance of airborne communication systems--The student will be able to:
- 07.01 Describe theory of operation of air to ground communication systems.
  - 07.02 Determine serviceability through performance checks of avionics communication systems.
  - 07.03 Troubleshoot to the component/module level malfunctioning communication systems/equipment.
  - 07.04 Repair and return to service air to ground communication systems/equipment.
  - 07.05 Analyze and troubleshoot communication transmitter switching and audio distribution circuits and equipment.
  - 07.06 Describe the theory of operation of emergency locator transmitters (ELTs).
  - 07.07 Perform preventative and regulatory maintenance and performance tests of ELTs.
  - 07.08 Troubleshoot defective ELTs, repair and return to service.
- 11.0 Demonstrate proficiency in installing avionics systems--The student will be able to:
- 11.01 Draw an interconnecting diagram and interconnect an IFR Avionics system for a single engine or light twin aircraft using acceptable methods, techniques and practices.
  - 11.02 Determine proper placement of the various antennas required for an IFR Avionics package on a light twin or single engine aircraft.
  - 11.03 Describe the effects of precipitation static on aircraft radios and standard methods of reduction.
  - 11.04 Compute the dimensions of an ADF Sense antenna for a typical installation.
  - 11.05 Apply the formula for weight and balance computation.
- 12.0 Demonstrate proficiency in the calibration of test equipment--The student will be able to:
- 12.01 Describe the regulatory requirements for repair station test equipment calibration.
  - 12.02 Calibrate frequency counters/meters.
  - 12.03 Calibrate general-purpose multimeters.
  - 12.04 Calibrate RF voltmeters.
  - 12.05 Calibrate RF powermeters, wattmeters, loads and attenuators.
  - 12.06 Calibrate audio signal generators and power meters.
  - 12.07 Calibrate oscilloscopes.
  - 12.08 Calibrate power supplies.
  - 12.09 Calibrate RF signal generators.
  - 12.10 Calibrate special purpose test sets normally used in an Avionics Repair Station.

**Course Number: AVS0092**  
**Occupational Completion Point: C**  
**Avionics Communication System Technician – 180 Hours – SOC Code 49-2091**

- 01.0 Demonstrate proficiency in AM and FM transmitters--The student will be able to:
- 01.01 Define DSB, SSB and FM modulation.
  - 01.02 Draw, analyze and troubleshoot AM and FM RF oscillator circuits.
  - 01.03 Draw, analyze and troubleshoot buffer and multiplier circuits.
  - 01.04 Draw, analyze and troubleshoot RF power amplifier circuits.
  - 01.05 Draw, analyze and troubleshoot AM and FM modulation circuits.
  - 01.06 Draw, analyze and troubleshoot microphone circuits.
  - 01.07 Draw, analyze and troubleshoot balanced modulators and SSB filter circuits.
  - 01.08 Draw, analyze and troubleshoot AM and FM power supply circuits.
  - 01.09 Make power, frequency and modulation measurements of AM and FM transmitters.
  - 01.10 Align and troubleshoot AM and FM transmitters.
  - 01.11 Describe FCC rules pertaining to AM and FM transmitter maintenance and operation.
- 02.0 Demonstrate proficiency in AM and FM receivers--The student will be able to:
- 02.01 Draw, analyze and troubleshoot receiver audio voltage and power amplifiers and speaker/headphone circuits.
  - 02.02 Draw, analyze and troubleshoot AM and FM detector circuits.
  - 02.03 Draw, analyze and troubleshoot AM IF amplifier circuits.
  - 02.04 Draw, analyze and troubleshoot FM IF amplifier and limited circuits.
  - 02.05 Draw, analyze and troubleshoot receiver oscillator and AFC circuits.
  - 02.06 Draw, analyze and troubleshoot RF mixer/hetrodyne circuits.
  - 02.07 Draw, analyze and troubleshoot receiver RF amplifier circuits.
  - 02.08 Draw, analyze and troubleshoot AVC/AGC circuits.
  - 02.09 Draw, analyze and troubleshoot receiver power supplies.
  - 02.10 Make receiver sensitivity, selectivity, bandwidth, image rejection and adjacent channel rejection measurements.
  - 02.11 Align and troubleshoot AM and FM receivers.
- 03.0 Demonstrate proficiency in AM and FM transceivers--The student will be able to:
- 03.01 Analyze and troubleshoot transceiver control, metering and switching circuits.
  - 03.02 Analyze and troubleshoot transceiver frequency synthesizers and phase locked loop circuits.
  - 03.03 Analyze and troubleshoot squelch circuits.
  - 03.04 Align and troubleshoot transceivers.
- 04.0 Demonstrate proficiency in electromagnetic wave emissions--The student will be able to:
- 04.01 Define the radio frequency spectrum.
  - 04.02 Define types and classification of RF emissions.
  - 04.03 Define the characteristics of radio waves.
  - 04.04 Define radio wave propagation method.
  - 04.05 Define the basic types of antennas.

- 04.06 Draw the voltage and current relationships and radiation patterns for the basic types of antennas.
- 04.07 Solve signal strength problems and measure signal strength.
- 04.08 Solve problems pertaining to antenna length, propagation velocity and frequency.
- 04.09 Define methods for antenna tuning, gain and directivity.
- 04.10 Define transmission lines in terms of electrical and physical properties.
- 04.11 Define standing waves, cause and effect, and measure standing wave ratios.
- 04.12 Define tuned transmission lines and describe applications.
- 04.13 Draw voltage, current and impedance relationships for tuned transmission lines.
- 04.14 Compute transmission line losses.
- 04.15 Construct transmission lines.
- 04.16 Define waveguides, resonant cavities and their applications.

**Course Number: AVS0093**

**Occupational Completion Point: D**

**Avionics Technician – 180 Hours – SOC Code 49-2091**

08.0 Demonstrate proficiency in line and bench maintenance of airborne radio navigation systems and equipment--The student will be able to:

- 08.01 Describe the principles and theory of operation of VHF omnirange receivers, converters and indicators.
- 08.02 Determine through performance checks, the serviceability of VHF omnirange systems.
- 08.03 Troubleshoot to the component/module level malfunctioning omnirange systems.
- 08.04 Repair and return to service omnirange systems equipment.
- 08.05 Describe the principles and theory of operation of instrument landing systems (ILS).
- 08.06 Determine through performance checks the serviceability of localizer, glideslope and marker beacon receivers, converters and indicators.
- 08.07 Troubleshoot to the component/module level malfunctioning ILS systems and equipment.
- 08.08 Repair and return to service ILS systems and equipment.
- 08.09 Describe the principles of operation of microwave landing systems.
- 08.10 Describe the principles and theory of operation of Automatic Direction Finders (ADF).
- 08.11 Determine through performance checks the serviceability of ADF systems.
- 08.12 Troubleshoot to the component/module level malfunctioning ADF systems.
- 08.13 Repair and return to service ADF systems.
- 08.14 Describe radio navigation systems/equipment interface with other aircraft instruments and systems.

09.0 Demonstrate proficiency in line and bench maintenance of airborne radar systems--The student will be able to:

- 09.01 Describe the principles and theory of operation of Air Traffic Control (ATC) transponders and altitude encoders.
- 09.02 Determine through performance checks the serviceability of ATC transponders and altitude encoders.
- 09.03 Troubleshoot to the component/module level ATC transponders.
- 09.04 Repair and return to service ATC transponders.

- 09.05 Describe the principles and theory of operation and Distance Measurements Equipment (DME).
  - 09.06 Determine through performance checks the serviceability of DME systems.
  - 09.07 Troubleshoot to the component/module level malfunctioning DME systems.
  - 09.08 Repair and return to service DME transponders.
  - 09.09 Describe the principles and basic theory of operation of weather radar systems.
  - 09.10 Describe the basic principles of operation of the 3M/RVAN Stormscope.
- 10.0 Demonstrate proficiency in the principles of operation of area navigation (R-NAV) systems--The student will be able to:
- 10.01 Describe the principles of operation of VHF R-NAV systems (VOR-DME).
  - 10.02 Describe the principles of operation of hyperbolic R-NAV systems (Loran C) (Omega/VAF).

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Medium and Heavy Duty Truck and Bus Technician 1  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T650100
CIP Number	0647060505
Grade Level	30, 31
Standard Length	1050 Hours
Teacher Certification	DIESEL MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031, 49-9098
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: 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.

## 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.

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0101	Diesel Engine Mechanic/Technician Helper	150	49-9098
B	DIM0102	Diesel Electrical and Electronics Technician	300	49-3031
C	DIM0104	Diesel Engine Technician	300	49-3031
D	DIM0105	Diesel Brakes Technician	300	49-3031

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment as bus, truck and diesel engine mechanics, diesel mechanics helpers, Mobile heavy equipment mechanics, construction equipment mechanics, industrial truck mechanics.

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 National Automotive Technicians Education Foundation (NATEF).

## Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.



## **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 program-specific OJT framework apply.

## **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

## **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0.

These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

## **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fldoe.org/workforce/dwdframe/artic\\_frame.asp](http://www.fldoe.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Identify shop organization, management, and safety requirements.
- 02.0 Identify the basic diesel components and functions.
- 03.0 Demonstrate the use of basic tools and equipment.
- 04.0 Demonstrate shop and occupational safety procedures.
- 05.0 Identify principles, assemblies, and systems of engine operation.
- 06.0 Demonstrate the qualifications for employment
- 07.0 Demonstrate mathematics knowledge and skills.
- 08.0 Demonstrate science knowledge and skills
- 09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
- 10.0 General Electrical Systems Diagnosis
- 11.0 Battery Diagnosis and Repair
- 12.0 Starting System Diagnosis and Repair
- 13.0 Charging System Diagnosis and Repair
- 14.0 Lighting Systems Diagnosis and Repair
  - 14.01 Headlights, Daytime Running Lights, Parking, Clearance, Tail, Cab, and Instrument Panel Lights
  - 14.02 Stoptlights, Turn Signals, Hazard Lights, and Back-up Lights

- 15.0 Gauges and Warning Devices Diagnosis and Repair
- 16.0 Related Electrical Systems
- 17.0 Demonstrate language arts knowledge and skills
- 18.0 Solve problems using critical thinking skills, creativity and innovation.
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 20.0 General Engine Diagnosis
- 21.0 Cylinder Head and Valve Train Diagnosis and Repair
- 22.0 Engine Block Diagnosis and Repair
- 23.0 Lubrication Systems Diagnosis and Repair
- 24.0 Cooling System Diagnosis and Repair
- 25.0 Air Induction and Exhaust Systems Diagnosis and Repair
- 26.0 Fuel System Diagnosis and Repair
  - 26.01 Fuel Supply System Diagnosis and Repair
  - 26.02 Mechanical Fuel Injection Diagnosis and Repair
  - 26.03 Electronic Fuel Management System Diagnosis and Repair
- 27.0 Engine Brakes
- 28.0 Use information technology tools
- 29.0 Describe the importance of professional ethics and legal responsibilities.
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies
- 31.0 Air Supply and Service Systems
- 32.0 Mechanical/Foundation
- 33.0 Parking Brakes
- 34.0 Hydraulic System
- 35.0 Mechanical/Foundation
- 36.0 Power Assist Units
- 37.0 Air and Hydraulic Antilock Brake Systems (ABS) and Automatic Traction Control (ATC)
- 38.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- 39.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives
- 40.0 Explain the importance of employability and entrepreneurship skills

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Medium and Heavy Duty Truck and Bus Technician 1**  
**PSAV Number: T650100**

**Course Number: DIM0101**

**Occupational Completion Point: A**

**Diesel Engine Mechanic/Technician Helper – 150 Hours – SOC Code 49-9098**

- 01.0 Identify shop organization, management, and safety requirements -- The student will be able to:
- 01.01 Identify basic shop organization and management regulations.
  - 01.02 Identify required shop-safety practices.
  - 01.03 Identify and describe shop-maintenance procedures, including precautions for handling and storing work-related 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 seals, gaskets, and fasteners.
  - 02.03 Identify drive power train components and functions.
  - 02.04 Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility
- 03.0 Demonstrate the use of basic tools and equipment -- The student will be able to:
- 03.01 Identify and use the following correctly and safely:
    - a) Basic hand tools
    - b) Basic welding tools and equipment
    - c) Power tools
    - d) Measuring and precision tools
  - 03.02 Read a digital multimeter
- 04.0 Demonstrate shop and occupational safety procedures --The student will be able to:
- 04.01 Assist in activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
  - 04.02 Identify and comply with personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and the handling, storage, and disposal of chemicals and hazardous materials.
- 05.0 Identify principles, assemblies, and systems of engine operation --The student will be able to:
- 05.01 Explain the basic principles in the operation of the four-stroke-cycle diesel engine
  - 05.02 Identify engine assemblies and systems.

- 05.03 Explain the operating principles of two-and-four-stroke-cycle engines.
- 05.04 Identify the equipment of two-and-four-stroke-cycle engines.
- 05.05 Identify governor types and their operating principles.

06.0 Demonstrate the qualifications for employment -- The student will be able to:

- 06.01 Demonstrate the shop organization, management, and safety requirements for a diesel engine technician.
- 06.02 Demonstrate the use of tools and equipment required for a diesel engine technician.
- 06.03 Demonstrate workplace communications skills required by diesel engine technician.
- 06.04 Demonstrate the application of math and science principles required for a diesel engine technician's job tasks.
- 06.05 Demonstrate employability skills as a diesel engine technician.

07.0 Demonstrate mathematics knowledge and skills. -- The students will be able to: AF3.0

- 07.01 Demonstrate knowledge of arithmetic operations. AF3.2
- 07.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
- 07.03 Construct charts/tables/graphs using functions and data. AF3.5

08.0 Demonstrate science knowledge and skills. -- The students will be able to: AF4.0

- 08.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
- 08.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

09.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas. -- The students will be able to:

- 09.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM 1.0
- 09.02 Locate, organize and reference written information from various sources. CM 3.0
- 09.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM 5.0
- 09.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM 6.0
- 09.05 Apply active listening skills to obtain and clarify information. CM 7.0
- 09.06 Develop and interpret tables and charts to support written and oral communications. CM 8.0
- 09.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM 10.0

**Course Number: DIM0102**  
**Occupational Completion Point: B**  
**Diesel Electrical and Electronics Technician – 300 Hours – SOC Code 49-3031**

- 10.0 General electrical systems diagnosis --The student will be able to:
- 10.01 Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams. (P-1)
  - 10.02 Check continuity in electrical/electronic circuits using appropriate test equipment. (P-1)
  - 10.03 Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM). (P-1)
  - 10.04 Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) or clamp-on ammeter. (P-1)
  - 10.05 Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM). (P-1)
  - 10.06 Find shorts, grounds, and opens in electrical/electronic circuits. (P-1)
  - 10.07 Diagnose parasitic (key-off) battery drain problems. (P-1)
  - 10.08 Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed. (P-2)
  - 10.09 Inspect and test spike suppression diodes/resistors; replace as needed. (P-3)
- 11.0 Battery diagnosis and repair -- The student will be able to:
- 11.01 Perform battery load test; determine needed action. (P-1)
  - 11.02 Determine battery state of charge using an open circuit voltage test. (P-2)
  - 11.03 Inspect, clean, and service battery; replace as needed. (P-2)
  - 11.04 Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed. (P-2)
  - 11.05 Charge battery using slow or fast charge method as appropriate. (P-2)
  - 11.06 Inspect, test, and clean battery cables and connectors; repair or replace as needed. (P-1)
  - 11.07 Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures. (P-1)
  - 11.08 Perform battery capacitance test; determine needed action. (P-2)
- 12.0 Starting system diagnosis and repair-- The student will be able to:
- 12.01 Perform starter current draw test; determine needed action. (P-3)
  - 12.02 Perform starter circuit cranking voltage and voltage drop tests; determine needed action. (P-1)
  - 12.03 Inspect, test, and replace components (key switch, push button and/or magnetic switch) and wires in the starter control circuit. (P-2)
  - 12.04 Inspect, test, and replace starter relays and solenoids/switches. (P-2)
  - 12.05 Remove and replace starter; inspect flywheel ring gear or flex plate. (P-3)
- 13.0 Charging system diagnosis and repair --The student will be able to:
- 13.01 Diagnose instrument panel mounted volt meters and/or indicator lamps that show a no charge, low charge, or overcharge condition; determine needed action. (P-1)
  - 13.02 Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action. (P-1)

- 13.03 Inspect, adjust, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment. (P-1)
- 13.04 Perform charging system voltage and amperage output test; determine needed action. (P-1)
- 13.05 Perform charging circuit voltage drop tests; determine needed action. (P-1)
- 13.06 Remove and replace alternator. P-3
- 13.07 Inspect, repair, or replace connectors and wires in the charging circuit. (P-2)
- 13.08 Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action. (P-1)

#### 14.0 Lighting Systems Diagnosis And Repair

##### 14.01 Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights --The student will be able to:

- 14.01.1 Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation. (P-1)
- 14.01.2 Test, aim, and replace headlights. (P-1)
- 14.01.3 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed. (P-1)
- 14.01.4 Inspect and test switches, bulbs/LEDs, sockets, connectors, terminals, relays and wires of parking, clearance, and taillight circuits; repair or replace as needed. (P-1)
- 14.01.5 Inspect and test instrument panel light circuit switches, relays, bulbs, sockets, connectors, terminals, wires, and printed circuits/control modules; repair or replace as needed. (P-2)
- 14.01.6 Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-2)
- 14.01.7 Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed. (P-1)

##### 14.02 Stoplights, turn signals, hazard lights, and back-up lights --The student will be able to:

- 14.02.1 Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-1)
- 14.02.2 Inspect and test turn signal and hazard circuit flasher(s), switches, relays, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed. (P-1)
- 14.02.3 Inspect, test, and adjust backup lights and warning device circuit switches, bulbs/LEDs, sockets, horns, buzzers, connectors, terminals, and wires; repair or replace as needed. (P-2)

#### 15.0 Gauges and warning devices diagnosis and repair --The student will be able to:

- 15.01 Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action. (P-1)
  - 15.02 Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action. (P-2)
  - 15.03 Diagnose the cause of data bus-driven gauge malfunctions; determine needed action. (P-3)
  - 15.04 Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed. (P-2)
  - 15.05 Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed. (P-2)
  - 15.06 Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems. (P-2)
- 16.0 Related electrical systems --The student will be able to:
- 16.01 Diagnose the cause of constant, intermittent, or no horn operation; determine needed action. (P-2)
  - 16.02 Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed. (P-2)
  - 16.03 Diagnose the cause of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems; determine needed action. (P-2)
  - 16.04 Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed. (P-2)
  - 16.05 Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed. (P-2)
  - 16.06 Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.07 Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.08 Inspect and test heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.09 Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed. (P-3)
  - 16.10 Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action. (P-3)
  - 16.11 Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed. (P-3)
  - 16.12 Inspect block heaters; determine needed repairs. (P-2)
  - 16.13 Inspect and test cruise control electrical components; repair or replace as needed. (P-3)
  - 16.14 Inspect and test engine cooling fan electrical control components; repair or replace as needed. (P-2)
  - 16.15 Diagnose cause of data buss communication problems; determine needed action.(P-3)
- 17.0 Demonstrate language arts knowledge and skills. -- The students will be able to: AF 2.0



- 17.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
- 17.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
- 17.03 Present information formally and informally for specific purposes and audiences. AF2.9
- 18.0 Solve problems using critical thinking skills, creativity and innovation. -- The students will be able to:
- 18.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
- 18.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS 2.0
- 18.03 Identify and document workplace performance goals and monitor progress toward those goals. PS 3.0
- 18.04 Conduct technical research to gather information necessary for decision-making. PS 4.0
- 19.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. -- The students will be able to:
- 19.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE 1.0
- 19.02 Explain emergency procedures to follow in response to workplace accidents.
- 19.03 Create a disaster and/or emergency response plan. SHE 2.0

**Course Number: DIM0104****Occupational Completion Point: C****Diesel Engine Technician – 300 Hours – SOC Code 49-3031**

- 20.0 General engine diagnosis -- The student will be able to:
- 20.01 Inspect fuel, oil, and coolant levels and condition, and consumption; determine needed action. (P-1)
- 20.02 Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action. (P-1)
- 20.03 Interpret engine noises; determine needed action. (P-2)
- 20.04 Observe engine exhaust smoke color and quantity; determine needed action. (P-1)
- 20.05 Perform air intake system restriction and leakage tests; determine needed action. (P-1)
- 20.06 Perform intake manifold pressure (boost) test; determine needed action. (P-1)
- 20.07 Perform exhaust back pressure test; determine needed action. (P-2)
- 20.08 Perform crankcase pressure test; determine needed action. (P-1)
- 20.09 Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action. (P-1)
- 20.10 Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action. (P-1)
- 20.11 Diagnose engine vibration problems; determine needed action. (P-2)
- 20.12 Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action. (P-1)
- 20.13 Perform cylinder compression test; determine needed action. (P-3)

21.0 Cylinder head and valve train diagnosis and repair -- The student will be able to:

- 21.01 Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly. (P-1)
- 21.02 Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action. (P-1)
- 21.03 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-1)
- 21.04 Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action. (P-3)
- 21.05 Measure valve head height relative to deck, valve face-to-seat contact; determine needed action. (P-3)
- 21.06 Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action. (P-3)
- 21.07 Inspect and adjust valve bridges (crossheads) and guides; perform needed action. (P-2)
- 21.08 Reassemble cylinder head. (P-3)
- 21.09 Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash. (P-2)
- 21.10 Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; perform needed action. (P-2)
- 21.11 Inspect cam followers; perform needed action. (P-2)
- 21.12 Adjust valve clearance. (P-1)

22.0 Engine block diagnosis and repair -- The student will be able to:

- 22.01 Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings. (P-1)
- 22.02 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-3)
- 22.03 Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action. (P-3)
- 22.04 Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action. (P-2)
- 22.05 Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion). (P-2)
- 22.06 Inspect in-block camshaft bearings for wear and damage; determine needed action. (P-3)
- 22.07 Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play. (P-3)
- 22.08 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)
- 22.09 Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play. (P-2)
- 22.10 Inspect, install, and time gear train; measure gear backlash; determine needed action. (P-3)

- 22.11 Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action. (P-2)
  - 22.12 Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons. (P-2)
  - 22.13 Assemble pistons and connecting rods; install in block; install rod bearings and check clearances. (P-2)
  - 22.14 Check condition of piston cooling jets (nozzles); determine needed action. P-3
  - 22.15 Inspect and measure crankshaft vibration damper; determine needed action. (P-3)
  - 22.16 Inspect, install, and align flywheel housing. (P-3)
  - 22.17 Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action. (P-3)
- 23.0 Lubrication systems diagnosis and repair -- The student will be able to:
- 23.01 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action. (P-1)
  - 23.02 Check engine oil level, condition, and consumption; determine needed action. (P-1)
  - 23.03 Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action. (P-3)
  - 23.04 Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action. (P-3)
  - 23.05 Inspect, clean, and test oil cooler and components; determine needed action. (P-3)
  - 23.06 Inspect turbocharger lubrication system; determine needed action. (P-2)
  - 23.07 Determine proper lubricant and perform oil and filter change. (P-1)
- 24.0 Cooling system diagnosis and repair -- The student will be able to:
- 24.01 Check engine coolant type, level, condition, and consumption; determine needed action. (P-1)
  - 24.02 Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action. (P-2)
  - 24.03 Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment. (P-1)
  - 24.04 Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed. (P-2)
  - 24.05 Test coolant for freeze protection and additive package concentration; adjust as needed. (P-1)
  - 24.06 Recover, flush, and refill with recommended coolant/additive package; bleed cooling system. (P-1)
  - 24.07 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed. (P-1)
  - 24.08 Inspect water pump and hoses; replace as needed. (P-1)
  - 24.09 Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action. (P-1)
  - 24.10 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed. (P-2)
- 25.0 Air induction and exhaust systems diagnosis and repair -- The student will be able to:

- 25.01 Inspect turbocharger(s), wastegate, and piping systems; determine needed action. (P-2)
- 25.02 Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed. (P-1)
- 25.03 Remove and reinstall turbocharger/wastegate assembly. (P-2)
- 25.04 Inspect intake manifold, gaskets, and connections; replace as needed. (P-3)
- 25.05 Inspect, clean, and test charge air cooler assemblies; replace as needed. (P-2)
- 25.06 Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed. (P-2)
- 25.07 Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action. (P-2)

## 26.0 Fuel System Diagnosis And Repair

26.01 Fuel supply system diagnosis and repair -- The student will be able to:

- 26.01.1 Check fuel level, quality, and consumption; determine needed action. (P-1)
- 26.01.2 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action. (P-1)
- 26.01.3 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)
- 26.01.4 Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action. (P-1)
- 26.01.5 Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump. (P-1)

26.02 Mechanical fuel injection diagnosis and repair -- The student will be able to:

- 26.02.1 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time a distributor (rotary) type injection pump; determine needed action. (P-3)
- 26.02.2 Perform on-engine inspections, tests, and adjustments; check and adjust timing or replace and time an in-line type injection pump; determine needed action. (P-3)
- 26.02.3 Inspect and adjust throttle control linkage; determine needed action. (P-3)
- 26.02.4 Inspect air/fuel ratio control systems; determine needed action. (P-3)
- 26.02.5 Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action. (P-3)
- 26.02.6 Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed. (P-3)

26.03 Electronic fuel management system diagnosis and repair -- The student will be able to:

- 26.03.1 Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM); determine needed action. (P-1)
- 26.03.2 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action. (P-1)
- 26.03.3 Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams). (P-1)
- 26.03.4 Inspect and replace electrical connector terminals, seals, and locks. (P-2)
- 26.03.5 Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed. (P-1)
- 26.03.6 Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters. (P-1)
- 26.03.7 Inspect, test, and adjust electronic unit injectors (EUI); determine needed action. (P-2)
- 26.03.8 Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable). (P-2)
- 26.03.9 Perform cylinder contribution test utilizing recommended electronic diagnostic tool. (P-1)
- 26.03.10 Perform engine timing sensor calibration (if applicable). (P-3)
- 26.03.11 Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action. (P-2)
- 26.03.12 Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI)-high pressure oil supply and control system; determine needed action. (P-2)
- 26.03.13 Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action. (P-2)
- 26.03.14 Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action. (P-2)
- 26.03.15 Perform on-engine inspections and tests on common rail type injection systems; determine needed action. (P-3)

27.0 Engine brakes -- The student will be able to:

- 27.01 Inspect and adjust engine compression/exhaust brakes; determine needed action. (P-2)
- 27.02 Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed. (P-3)
- 27.03 Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed. (P-3)

28.0 Use information technology tools. -- The students will be able to:

- 28.01 Use personal information management (PIM) applications to increase workplace efficiency. IT 1.0
- 28.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT 2.0
- 28.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT 3.0
- 28.04 Employ collaborative/groupware applications to facilitate group work. IT 4.0
- 29.0 Describe the importance of professional ethics and legal responsibilities. -- The students will be able to:
- 29.01 Evaluate and justify decisions based on ethical reasoning. ELR 1.0
- 29.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
- 29.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
- 29.04 Interpret and explain written organizational policies and procedures. ELR 2.0
- 30.0 Demonstrate personal money-management concepts, procedures, and strategies. -- The students will be able to:
- 30.01 Identify and describe the services and legal responsibilities of financial institutions. FL 2.0
- 30.02 Describe the effect of money management on personal and career goals. FL 3.0
- 30.03 Develop a personal budget and financial goals. FL3.1
- 30.04 Complete financial instruments for making deposits and withdrawals. FL3.2
- 30.05 Maintain financial records. FL3.3
- 30.06 Read and reconcile financial statements. FL3.4
- 30.07 Research, compare and contrast investment opportunities.

**Course Number: DIM0105****Occupational Completion Point: D****Diesel Brakes Technician – 300 Hours – SOC Code 49-3031****Air Brakes Diagnosis and Repair**

- 31.0 Air supply and service systems -- The student will be able to:
- 31.01 Diagnose poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determine needed action. (P-1)
- 31.02 Check air system build-up time; determine needed action. (P-1)
- 31.03 Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action. (P-1)
- 31.04 Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed. (P-1)
- 31.05 Inspect compressor drive gear and coupling; replace as needed. (P-3)
- 31.06 Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed. P-2
- 31.07 Inspect and test system pressure controls: governor, unloader assembly valves,

- intake screens, filters, lines, hoses, and fittings; replace as needed. P-2
- 31.08 Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed. (P-1)
  - 31.09 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)
  - 31.10 Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed. (P-1)
  - 31.11 Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed. (P-1)
  - 31.12 Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed. (P-1)
  - 31.13 Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed. (P-1)
  - 31.14 Inspect and test brake relay valve; replace as needed. (P-1)
  - 31.15 Inspect and test quick release valves; replace as needed. (P-1)
  - 31.16 Inspect and test front and rear axle limiting (proportioning) valves; replace as needed. (P-3)
  - 31.17 Inspect and test tractor protection valve; replace as needed. (P-1)
  - 31.18 Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed. (P-1)
  - 31.19 Inspect and test low pressure warning devices, wiring, and connectors; replace as needed. (P-1)
  - 31.20 Inspect and test air pressure gauges, lines, and fittings; replace as needed. (P-2)
- 32.0 Mechanical/foundation -- The student will be able to:
- 32.01 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)
  - 32.02 Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed. (P-1)
  - 32.03 Inspect and service manual and automatic slack adjusters; perform needed action. (P-1)
  - 32.04 Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs; replace as needed (P-1)
  - 32.05 Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs. (P-3)
  - 32.06 Inspect and measure brake shoes, linings, or pads; perform needed action. (P-1)
  - 32.07 Inspect and measure brake drums or rotors; perform needed action. (P-1)
- 33.0 Parking brakes -- The student will be able to:
- 33.01 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)
  - 33.02 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed. (P-1)
  - 33.03 Inspect and test parking (spring) brake application and release valve; replace as needed. (P-2)

- 33.04 Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations. (P-1)

### **Hydraulic Brakes Diagnosis and Repair**

#### 34.0 Hydraulic system -- The student will be able to:

- 34.01 Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action. (P-1)
- 34.02 Check and adjust brake pedal pushrod length. (P-3)
- 34.03 Inspect and test master cylinder for internal/external leaks and damage; replace as needed. (P-1)
- 34.04 Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed. (P-1)
- 34.05 Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed. (P-2)
- 34.06 Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed. (P-2)
- 34.07 Inspect and clean wheel cylinders; replace as needed. (P-1)
- 34.08 Inspect and clean disc brake caliper assemblies; replace as needed. (P-1)
- 34.09 Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type. (P-1)
- 34.10 Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed. (P-1)

#### 35.0 Mechanical/foundation -- The student will be able to:

- 35.01 Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action. (P-1)
- 35.02 Inspect and measure brake drums and rotors; perform needed action. (P-1)
- 35.03 Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action. (P-1)
- 35.04 Inspect and measure disc brake pads/linings; inspect mounting hardware; perform needed action. (P-1)
- 35.05 Check parking brake operation; inspect parking brake applications and holding devices; adjust and replace as needed. (P-1)

#### 36.0 Power assist units -- The student will be able to:

- 36.01 Diagnose poor stopping problems caused by the brake assist (booster) system; determine needed action. (P-2)
- 36.02 Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type. (P-2)
- 36.03 Check emergency (back-up, reserve) brake assist system. (P-2)

#### 37.0 Air and hydraulic antilock brake systems (abs) and automatic traction control (ATC) -- The student will be able to:

- 37.01 Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action. (P-1)



- 37.02 Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action. (P-1)
  - 37.03 Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action. (P-1)
  - 37.04 Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action. (P-1)
  - 37.05 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).(P-1)
  - 37.06 Bleed the ABS hydraulic circuits following manufacturers' procedures. (P-2)
  - 37.07 Observe automatic traction control (ATC) warning light operation; determine needed action. (P-3)
  - 37.08 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)
- 38.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. -- The students will be able to:
- 38.01 Describe the nature and types of business organizations. SY 1.0
  - 38.02 Explain the effect of key organizational systems on performance and quality.
  - 38.03 List and describe quality control systems and/or practices common to the workplace. SY 2.0
  - 38.04 Explain the impact of the global economy on business organizations.
- 39.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. -- The students will be able to:
- 39.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
  - 39.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
  - 39.03 Conduct and participate in meetings to accomplish work tasks. LT 4.0
  - 39.04 Employ mentoring skills to inspire and teach others. LT 5.0
- 40.0 Explain the importance of employability and entrepreneurship skills. -- The students will be able to:
- 40.01 Identify and demonstrate positive work behaviors needed to be employable.ECD 1.0
  - 40.02 Develop personal career plan that includes goals, objectives, and strategies.ECD 2.0
  - 40.03 Examine licensing, certification, and industry credentialing requirements. ECD 3.0
  - 40.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD 5.0
  - 40.05 Evaluate and compare employment opportunities that match career goals. ECD 6.0
  - 40.06 Identify and exhibit traits for retaining employment. ECD 7.0
  - 40.07 Identify opportunities and research requirements for career advancement. ECD 8.0
  - 40.08 Research the benefits of ongoing professional development. ECD 9.0
  - 40.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD 10.0

2011 – 2012

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Medium and Heavy Duty Truck and Bus Technician 2  
**Program Type:** Career Preparatory  
**Career Cluster:** Transportation, Distribution and Logistics

PSAV	
Program Number	T650200
CIP Number	0647060506
Grade Level	30, 31
Standard Length	750 Hours
Teacher Certification	DIESEL MECH @7 G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031
Facility Code	245 <a href="http://www.fldoe.org/edfacil/sref.asp">http://www.fldoe.org/edfacil/sref.asp</a> (State Requirements for Educational Facilities)
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>
Perkins Technical Skill Attainment Inventory	<a href="http://www.fldoe.org/workforce/perkins/perkins_resources.asp">http://www.fldoe.org/workforce/perkins/perkins_resources.asp</a>
Industry Certifications	<a href="http://www.fldoe.org/workforce/fcpea/default.asp">http://www.fldoe.org/workforce/fcpea/default.asp</a>
Basic Skills Level	Mathematics: 9.0 Language: 9.0 Reading: 9.0

### **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 the following: 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.

## Program Structure

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

The courses may be taken in any sequence. However, an individual must take the Preventive Maintenance course.

When offered at the post secondary adult career and technical 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.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0103	Diesel Engine Preventative Maintenance Technician	150	49-3031
B	DIM0106	Diesel Heating and Air Conditioning Technician	150	49-3031
C	DIM0107	Diesel Steering and Suspension Technician	150	49-3031
D	DIM0108	Diesel Drivetrain Technician	150	49-3031
E	DIM0109	Diesel Hydraulics Technician	150	49-3031

## Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## Special Notes

The purpose of this program is to prepare students for employment as bus, truck and diesel engine mechanics, diesel mechanics helpers, Mobile heavy equipment mechanics, construction equipment mechanics, industrial truck mechanics.

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 National Automotive Technicians Education Foundation (NATEF).

## Career and Technical Student Organization (CTSO)

SkillsUSA is the appropriate career and technical student organization for 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. The

activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **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 program-specific OJT framework apply.

### **Essential Skills**

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website

([http://www.fldoe.org/workforce/dwdframe/essential\\_skills.asp](http://www.fldoe.org/workforce/dwdframe/essential_skills.asp)).

### **Basic Skills (if applicable)**

In PSAV 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: Mathematics 9.0, Language 9.0, and Reading 9.0. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination. Students may be exempt from meeting the Basic Skills requirements by earning an eligible industry certification. See the Basic Skills Exemption List document for a list of eligible industry certifications

(<http://www.fldoe.org/workforce/dwdframe/rtf/basic-skills.rtf>).

Adult students with disabilities, as defined in Section 1004.02(7), 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(3)(a), F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination pursuant to Section 1008.29, F.S.; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.)

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan 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 postsecondary service provider. 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.

In addition to accommodations, some secondary students with disabilities (ESE) will need modifications to meet their special needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular occupational completion point (OCP) or a modified occupational completion point (MOCP). If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP(s)/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

### **Articulation**

This program has no statewide articulation agreement approved by the Articulation Coordinating Committee. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to [http://www.fl DOE.org/workforce/dwdframe/artic\\_frame.asp](http://www.fl DOE.org/workforce/dwdframe/artic_frame.asp).

### **Standards**

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

- 01.0 Engine
- 02.0 Fuel System
- 03.0 Air Induction and Exhaust System
- 04.0 Cooling System
- 05.0 Lubrication System
- 06.0 Instruments and Controls
- 07.0 Safety Equipment
- 08.0 Hardware
- 09.0 Heating, Ventilation, & Air Conditioning (HVAC)
- 10.0 Battery and Starting Systems
- 11.0 Charging System
- 12.0 Lighting System
- 13.0 Air Brakes
- 14.0 Hydraulic Brakes
- 15.0 Drive Train

- 16.0 Suspension and Steering Systems
- 17.0 Tires and Wheels
- 18.0 Frame and Fifth Wheel
- 19.0 HVAC Systems Diagnosis, Service, and Repair
- 20.0 A/C System - General
- 21.0 Compressor and Clutch
- 22.0 Evaporator, Condenser, and Related Components
- 23.0 Heating and Engine Cooling Systems Diagnosis, Service, and Repair
- 24.0 Electrical
- 25.0 Air/Vacuum/Mechanical
- 26.0 Refrigerant Recovery, Recycling, and Handling
- 27.0 Steering Column
- 28.0 Steering Units
- 29.0 Steering Linkage
- 30.0 Suspension Systems Diagnosis and Repair
- 31.0 Wheel Alignment Diagnosis, Adjustment, and Repair
- 32.0 Wheels and Tires Diagnosis and Repair
- 33.0 Frame Service and Repair
- 34.0 Clutch Diagnosis and Repair
- 35.0 Transmission Diagnosis and Repair
- 36.0 Driveshaft and Universal Joint Diagnosis and Repair
- 37.0 Drive Axle Diagnosis and Repair
- 38.0 General System Operation
- 39.0 Pumps
- 40.0 Filtration/ Reservoirs (Tanks)
- 41.0 Hoses, Fittings, and Connections
- 42.0 Control Valves
- 43.0 Actuators

**For every task in Hydraulics, 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 Hydraulics is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.**

2011 – 2012

**Florida Department of Education  
Student Performance Standards**

**Program Title: Heavy Duty Truck and Bus Technician 2**  
**PSAV Number: T650200**

**Course Number: DIM0103**  
**Occupational Completion Point: A**  
**Diesel Engine Preventative Maintenance Technician – 150 Hours – SOC Code 49-3031**

**Engine System**

01.0 Engine--The student will be able to:

- 01.01 Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed rpm.
- 01.02 Inspect vibration damper.
- 01.03 Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.
- 01.04 Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off).
- 01.05 Inspect engine mounts for looseness and deterioration.
- 01.06 Check engine for oil, coolant, air, fuel and exhaust leaks (EngineRunning).
- 01.07 Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM).

02.0 Fuel system--The student will be able to:

- 02.01 Check fuel tanks, mountings, lines, caps, and vents.
- 02.02 Inspect throttle linkages and return springs.
- 02.03 Drain water from fuel system.
- 02.04 Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.

03.0 Air induction and exhaust system--The student will be able to:

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

04.0 Cooling system--The student will be able to:

- 04.01 Check operation of fan clutch.
- 04.02 Inspect radiator (including air flow restriction, leaks, and damage) and mountings.
- 04.03 Inspect fan assembly and shroud.

- 04.04 Pressure test cooling system and radiator cap.
- 04.05 Inspect coolant hoses and clamps.
- 04.06 Inspect coolant recovery system.
- 04.07 Check coolant for contamination, supplemental coolant additives concentration, and protection level (freeze point).
- 04.08 Service coolant filter/conditioner.
- 04.09 Inspect water pump for leaks and bearing play.

05.0 Lubrication system--The student will be able to:

- 05.01 Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.
- 05.02 Take an engine oil sample.

**Cab and Hood**

06.0 Instruments And Controls--The student will be able to:

- 06.01 Inspect key condition and operation of ignition switch.
- 06.02 Check warning indicators.
- 06.03 Check instruments; record oil pressure and system voltage.
- 06.04 Check mechanical, electronic, and emergency shut down operation.
- 06.05 Check mechanical and electronic engine speed controls.
- 06.06 Check heater, ventilation, and air conditioning (HVAC) controls.
- 06.07 Check operation of all accessories.
- 06.08 Using diagnostic tool or on-board diagnostic system; extract engine monitoring information.

07.0 Safety Equipment--The student will be able to:

- 07.01 Check operation of electric/air horns and back-up warning devices.
- 07.02 Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals.
- 07.03 Inspect seat belts and sleeper restraints.
- 07.04 Inspect wiper blades and arms.

08.0 Hardware--The student will be able to:

- 08.01 Check wiper and washer operation.
- 08.02 Inspect windshield glass for cracks or discoloration; check sun visor.
- 08.03 Check seat condition, operation, and mounting.
- 08.04 Check door glass and window operation.
- 08.05 Inspect steps and grab handles.
- 08.06 Inspect mirrors, mountings, brackets, and glass.
- 08.07 Record all observed physical damage.
- 08.08 Lubricate all cab and hood grease fittings.
- 08.09 Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.
- 08.10 Inspect cab mountings, hinges, latches, linkages and ride height; service as needed.



08.11 Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed.

09.0 Heating, Ventilation, & Air Conditioning (Hvac)--The student will be able to:

- 09.01 Inspect A/C condenser and lines for condition and visible leaks; check mountings.
- 09.02 Inspect A/C compressor and lines for condition and visible leaks; check mountings.
- 09.03 Check A/C system condition and operation; check A/C monitoring system, if applicable.
- 09.04 Check HVAC air inlet filters and ducts; service as needed.

## **Electrical/Electronics**

10.0 Battery and starting systems--The student will be able to:

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

11.0 Charging system--The student will be able to:

- 11.01 Inspect alternator, mountings, wiring and wiring routing; determine needed action.
- 11.02 Perform alternator current output test.
- 11.03 Perform alternator voltage output test.

12.0 Lighting system--The student will be able to:

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

## **Frame and Chassis**

13.0 Air brakes--The student will be able to:

- 13.01 Check parking brake operation.
- 13.02 Record air governor cut-out setting (PSI).
- 13.03 Check air drier drain valve operation.
- 13.04 Check air system for leaks (brakes released).
- 13.05 Check air system for leaks (brakes applied).
- 13.06 Test one-way and double-check valves.
- 13.07 Check low air pressure warning devices.

- 13.08 Check air governor cut-in pressure.
- 13.09 Check emergency (spring) brake control/modulator valve, if applicable.
- 13.10 Check tractor protection valve.
- 13.11 Test air pressure build-up time.
- 13.12 Inspect coupling air lines, holders, and gladhands.
- 13.13 Check brake chambers and air lines for secure mounting and damage.
- 13.14 Service air drier.
- 13.15 Inspect and record brake lining/pad condition, thickness, and contamination.
- 13.16 Inspect and record condition of brake drums/rotors.
- 13.17 Check operation of brake manual slack adjusters; adjust as needed.
- 13.18 Check operation and adjustment of brake automatic slack adjusters.
- 13.19 Lubricate all brake component grease fittings.
- 13.20 Check condition and operation of hand brake (trailer) control valve.
- 13.21 Perform antilock brake system (ABS) operational system self-test.
- 13.22 Drain air tanks and check for contamination.
- 13.23 Check condition of pressure relief (safety) valves

14.0 Hydraulic brakes--The student will be able to:

- 14.01 Check master cylinder fluid level and condition.
- 14.02 Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.
- 14.03 Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.
- 14.04 Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift).
- 14.05 Inspect wheel cylinders/calipers for leakage and damage.
- 14.06 Inspect power brake booster(s), hoses; and check/control valves; check power brake booster, reservoir fluid level and condition.
- 14.07 Inspect and record brake lining/pad condition and thickness, and contamination.
- 14.08 Inspect and record condition of brake drums/rotors.
- 14.09 Adjust drum brakes.

15.0 Drive train -- The student will be able to:

- 15.01 Check operation of clutch, clutch brake, and gearshift.
- 15.02 Check clutch linkage/cable for looseness or binding, if applicable.
- 15.03 Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.
- 15.04 Check clutch adjustment; adjust as needed.
- 15.05 Check transmission case, seals, filter, hoses, and cooler for cracks and leaks.
- 15.06 Inspect transmission breather.
- 15.07 Inspect transmission mounts.
- 15.08 Check transmission oil level, type, and condition.
- 15.09 Inspect U-joints, yokes, drive lines, and center bearings for looseness, damage, and proper phasing.
- 15.10 Inspect axle housing(s) for cracks and leaks.
- 15.11 Inspect axle breather(s).
- 15.12 Lubricate all drive train grease fittings.
- 15.13 Check drive axle(s) oil level, type, and condition.
- 15.14 Change drive axle(s) oil and filter; check and clean magnetic plugs.
- 15.15 Check two-speed axle unit operation and oil level.
- 15.16 Change transmission oil and filter; check and clean magnetic plugs.

- 15.17 Check interaxle differential lock operation.
- 15.18 Check range shift operation.

16.0 Suspension and steering systems -- The student will be able to:

- 16.01 Check steering wheel operation for free play or binding.
- 16.02 Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level.
- 16.03 Change power steering fluid and filter.
- 16.04 Inspect steering gear for leaks and secure mounting.
- 16.05 Inspect steering shaft U-joints, pinch bolts, splines, pitman arm-to-steering sector shaft, tie rod ends, linkage, and linkage-assistpower steering cylinders.
- 16.06 Check king pin wear.
- 16.07 Check wheel bearings for looseness and noise.
- 16.08 Check oil level and condition in all non-drive hubs; check for leaks.
- 16.09 Remove and inspect wheel bearings; reassemble and adjust.
- 16.10 Inspect springs, hangers, shackles, spring U-bolts, and insulators.
- 16.11 Inspect shock absorbers for leaks and secure mounting.
- 16.12 Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.
- 16.13 Check and record suspension ride height.
- 16.14 Lubricate all suspension and steering grease fittings.
- 16.15 Check toe adjustment.
- 16.16 Check tandem axle alignment and spacing.
- 16.17 Check axle locating components (radius, torque, and/or track rods).

17.0 Tires and wheels--The student will be able to:

- 17.01 Inspect tires for irregular wear patterns and proper mounting of directional tires.
- 17.02 Inspect tires for cuts, cracks, bulges, and sidewall damage.
- 17.03 Inspect valve caps and stems; replace as needed.
- 17.04 Measure and record tread depth; probe for imbedded debris.
- 17.05 Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications.
- 17.06 Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed.
- 17.07 Retorque lugs in accordance with manufacturer's specifications.
- 17.08 Inspect wheels and spacers for cracks or damage.
- 17.09 Check tire matching (diameter and tread) on dual tire installations.

18.0 Frame And Fifth Wheel--The student will be able to:

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

**Course Number: DIM0106**

**Occupational Completion Point: B**

**Diesel Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3031**

19.0 Hvac systems diagnosis, service, and repair--The student will be able to:

- 19.01 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action.
- 19.02 Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action.
- 19.03 Identify system type and components (cycling clutch orifice tube - CCOT, expansion valve) and conduct performance test(s) on HVAC systems; determine needed action.

### **A/C System and Component Diagnosis, Service, And Repair**

20.0 A/C system – General--The student will be able to:

- 20.01 Diagnose the cause of temperature control problems in the A/C system; determine needed action.
- 20.02 Identify refrigerant type and check for contamination; determine needed action.
- 20.03 Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action.
- 20.04 Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action.
- 20.05 Perform A/C system leak test; determine needed action.
- 20.06 Evacuate A/C system using appropriate equipment.
- 20.07 Internally clean contaminated A/C system components and hoses.
- 20.08 Charge A/C system with refrigerant.
- 20.09 Identify lubricant type needed for system application.

21.0 Compressor and clutch--The student will be able to:

- 21.01 Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action.
- 21.02 Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices.
- 21.03 Inspect, and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment.
- 21.04 Inspect, test, service, and replace A/C compressor clutch components or assembly.
- 21.05 Inspect and correct A/C compressor lubricant level (if applicable).
- 21.06 Inspect, test, and replace A/C compressor.
- 21.07 Inspect, repair, or replace A/C compressor mountings and hardware.

22.0 Evaporator, condenser, and related components--The student will be able to:

- 22.01 Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses.
- 22.02 Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action.

- 22.03 Inspect A/C condenser for proper air flow.
- 22.04 Inspect and test A/C system condenser and mountings; determine needed action.
- 22.05 Inspect and replace receiver/drier or accumulator/drier.
- 22.06 Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action.
- 22.07 Inspect and replace orifice tube.
- 22.08 Inspect and test cab/sleeper evaporator core; determine needed action
- 22.09 Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter.
- 22.10 Identify and inspect A/C system service ports (gauge connections); determine needed action.
- 22.11 Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action.

23.0 Heating and engine cooling systems diagnosis, service, and repair--The student will be able to:

- 23.01 Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action.
- 23.02 Diagnose window fogging problems; determine needed action.
- 23.03 Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action.
- 23.04 Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action.
- 23.05 Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action.
- 23.06 Inspect water pump for leaks and bearing play; determine needed action.
- 23.07 Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs.
- 23.08 Recover, flush and refill with recommended coolant/additive package; bleed cooling system.
- 23.09 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.
- 23.10 Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action.
- 23.11 Inspect and flush heater core; determine needed action.

### **Operating Systems and Related Controls Diagnosis and Repair**

24.0 Electrical--The student will be able to:

- 24.01 Diagnose the cause of failures in HVAC electrical control systems; determine needed action.
- 24.02 Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action.
- 24.03 Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action.
- 24.04 Inspect and test A/C-related electronic engine control systems; determine needed action.

- 24.05 Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors wiring, and protection devices; determine needed action.
- 24.06 Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action.
- 24.07 Inspect and test HVAC system electrical control panel assemblies; determine needed action.

25.0 Air/vacuum/mechanical--The student will be able to:

- 25.01 Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action.
- 25.02 Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action.
- 25.03 Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action.
- 25.04 Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action.
- 25.05 Inspect and test HVAC system vacuum reservoir(s), check valve(s), and restrictors; determine needed action.
- 25.06 Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action.

26.0 Refrigerant recovery, recycling, and handling--The student will be able to:

**NOTE: Tasks 1 through 5 should be accomplished in accordance with published EPA and appropriate SAE "J" standards for R-12, R-134a, and EPA approved refrigerant blends.**

- 26.01 Maintain and verify correct operation of certified equipment.
- 26.02 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.
- 26.03 Recycle refrigerant.
- 26.04 Handle, label, and store refrigerant.
- 26.05 Test recycled refrigerant for non-condensable gases.

**Course Number: DIM0107**

**Occupational Completion Point: C**

**Diesel Steering and Suspension Technician – 150 Hours – SOC Code 49-3031**

**Steering Systems Diagnosis and Repair**

27.0 Steering column--The student will be able to:

- 27.01 Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action.
- 27.02 Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action.
- 27.03 Check and adjust cab mounting and ride height.
- 27.04 Center the steering wheel as needed.
- 27.05 Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures.

28.0 Steering units--The student will be able to:

- 28.01 Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed action.
- 28.02 Determine recommended type of power steering fluid; check level and condition; determine needed action.
- 28.03 Flush and refill power steering system; purge air from system.
- 28.04 Perform power steering system pressure, temperature, and flow tests; determine needed action.
- 28.05 Inspect, service, or replace power steering reservoir including filter, seals, and gaskets.
- 28.06 Inspect, and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.
- 28.07 Inspect, replace as required, power steering pump drive gear and coupling.
- 28.08 Inspect, adjust, or replace power steering pump, mountings, and brackets.
- 28.09 Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings.
- 28.10 Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system).
- 28.11 Inspect, adjust, repair, or replace integral type power steering gear and mountings.
- 28.12 Adjust manual and automatic steering gear poppet/relief valves.

29.0 Steering linkage--The student will be able to:

- 29.01 Inspect and align pitman arm; replace as needed.
- 29.02 Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed.
- 29.03 Inspect steering arm and levers, and linkage pivot joints; replace as needed.
- 29.04 Inspect clamps and retainers on cross tube/relay rod/centerline/tie rod; position or replace as needed.
- 29.05 Check and adjust wheel stops.
- 29.06 Lubricate steering linkage joints as needed.

30.0 Suspension systems diagnosis and repair--The student will be able to:

- 30.01 Inspect front axles, U-bolts, and nuts; determine needed action.
- 30.02 Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action.
- 30.03 Inspect shock absorbers, bushings, brackets, and mounts; replace as needed.
- 30.04 Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action.
- 30.05 Inspect torque arms, bushings, and mounts; determine needed action.
- 30.06 Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action.
- 30.07 Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed.
- 30.08 Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; adjust, repair or replace as needed.

- 30.09 Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed.
- 30.10 Measure vehicle ride height; determine needed action.
- 30.11 Diagnose rough ride problems; determine needed action.

31.0 Wheel alignment diagnosis, adjustment, and repair--The student will be able to:

- 31.01 Diagnose vehicle wandering, pulling, shimmy, hard steering and off-center steering wheel problem(s); adjust and repair as needed.
- 31.02 Check camber; determine needed action.
- 31.03 Check caster; adjust as needed.
- 31.04 Check toe; adjust as needed.
- 31.05 Check rear axle(s) alignment (thrust line/centerline) and tracking; adjust or repair as needed.
- 31.06 Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action.
- 31.07 Check front axle alignment (centerline); adjust or repair as needed.

32.0 Wheels and tires diagnosis and repair -- The student will be able to:

- 32.01 Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action.
- 32.02 Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action.

33.0 Frame service and repair -- The student will be able to:

- 33.01 Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action.
- 33.02 Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.
- 33.03 Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs.
- 33.04 Inspect, install, or repair frame hangers, brackets, and crossmembers in accordance with manufacturers' recommended procedures.
- 33.05 Inspect, repair or replace pintle hooks and draw bars.

**Course Number: DIM0108**

**Occupational Completion Point: D**

**Diesel Drivetrain Technician – 150 Hours – SOC Code 49-3031**

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

34.0 Clutch diagnosis and repair--The student will be able to:

- 34.01 Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.
- 34.02 Inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull-type assemblies); check pedal height and travel; perform needed action.



- 34.03 Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.
  - 34.04 Inspect, adjust, lubricate or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.
  - 34.05 Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc.
  - 34.06 Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.
  - 34.07 Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action.
  - 34.08 Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms.
  - 34.09 Inspect and replace pilot bearing.
  - 34.10 Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action.
  - 34.11 Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action.
  - 34.12 Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action.
- 35.0 Transmission diagnosis and repair -- The student will be able to:
- 35.01 Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action.
  - 35.02 Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action.
  - 35.03 Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers.
  - 35.04 Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.
  - 35.05 Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action.
  - 35.06 Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed.
  - 35.07 Check transmission fluid level and condition; determine needed service; add proper type of lubricant.
  - 35.08 Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.
  - 35.09 Remove and reinstall transmission.
  - 35.10 Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed.
  - 35.11 Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed.
  - 35.12 Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed.
  - 35.13 Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed.
  - 35.14 Inspect and/or replace reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable).

- 35.15 Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed.
  - 35.16 Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed.
  - 35.17 Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed.
  - 35.18 Inspect transmission oil filters and coolers; replace as needed.
  - 35.19 Inspect mechanical and electronic speedometer components; determine needed action.
  - 35.20 Inspect and adjust power take-off (P.T.O.) assemblies, controls, and shafts; perform needed action.
  - 35.21 Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed.
  - 35.22 Inspect and test transmission temperature gauge sending unit/sensor; determine needed action.
  - 35.23 Inspect, test operation, adjust, repair, or replace automated mechanical transmission and manual electronic shift controls, shift, range and splitter solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses.
  - 35.24 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, air and electrical switches, displays and indicators, wiring harnesses, and air lines.
  - 35.25 Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs.
  - 35.26 Inspect, test operation, adjust, repair, or replace automatic transmission electronic and manual shift controls, shift solenoids, shift motors, indicators, speed and range sensors, electronic/transmission control units (ECU/TCE) neutral/in gear and reverse switches and wiring harnesses.
  - 35.27 Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, switches, displays and indicators, wiring harnesses.
  - 35.28 Use appropriate diagnostic tools and procedures to diagnose automated transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed repairs.
- 36.0 Driveshaft and universal joint diagnosis and repair -- The student will be able to:
- 36.01 Diagnose driveshaft and universal joint noise and vibration problems; determine needed action.
  - 36.02 Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes.
  - 36.03 Inspect and replace driveshaft center support bearings and mounts; determine needed action.
  - 36.04 Measure and adjust drive line angles.
- 37.0 Drive axle diagnosis and repair--The student will be able to:
- 37.01 Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action.

- 37.02 Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals.
- 37.03 Check drive axle fluid level and condition; determine needed service; add proper type of lubricant.
- 37.04 Remove and replace differential carrier assembly.
- 37.05 Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings.
- 37.06 Inspect and replace components of locking differential case assembly.
- 37.07 Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action.
- 37.08 Measure ring gear runout; determine needed action.
- 37.09 Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings.
- 37.10 Measure and adjust drive pinion bearing preload.
- 37.11 Measure and adjust drive pinion depth.
- 37.12 Measure and adjust side bearing preload and ring gear backlash.
- 37.13 Check and interpret ring gear and pinion tooth contact pattern; determine needed action.
- 37.14 Inspect, adjust, or replace ring gear thrust block/bolt.
- 37.15 Inspect, adjust, repair, or replace planetary gear-type 2-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover, and springs.
- 37.16 Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors.
- 37.17 Inspect power divider (inter-axle differential) assembly; determine needed action.
- 37.18 Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.
- 37.19 Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters.
- 37.20 Inspect and replace drive axle shafts.
- 37.21 Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action.
- 37.22 Diagnose drive axle for wheel bearing noise and damage; perform needed action.
- 37.23 Inspect and test drive axle temperature gauge sending unit/sensor; determine needed action.
- 37.24 Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings.

**Course Number: DIM0109**

**Occupational Completion Point: E**

**Diesel Hydraulics Technician – 150 Hours – SOC Code 49-3031**

**For every task in Hydraulics, 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 Hydraulics is to listen to and verify the operator's concern, review past maintenance and repair documents, and determine necessary action.**

38.0 General system operation--The student will be able to:

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

39.0 Pumps--The student will be able to:

- 39.01 Identify system fluid type.
- 39.02 Identify causes of pump failure, unusual pump noises, and temperature, flow, and leakage problems; determine needed action.
- 39.03 Determine pump type, rotation, and drive system.
- 39.04 Remove and install pump; prime and/or bleed system.
- 39.05 Inspect pump inlet for restrictions and leaks; determine needed action.
- 39.06 Inspect pump outlet for restrictions and leaks; determine needed action.

40.0 Filtration/ reservoirs (tanks)--The student will be able to:

- 40.01 Identify type of filtration system; verify filter application and flow direction.
- 40.02 Service filters and breathers.
- 40.03 Identify causes of system contamination; determine needed action.
- 40.04 Take a hydraulic oil sample.
- 40.05 Check reservoir fluid level and condition; determine needed action.
- 40.06 Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines.

41.0 Hoses, fittings, and connections--The student will be able to:

- 41.01 Diagnose causes of component leakage, damage, and restriction; determine needed action.
- 41.02 Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed.
- 41.03 Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination.
- 41.04 Inspect and replace fitting seals and sealants.

42.0 Control valves--The student will be able to:

- 42.01 Pressure test system safety relief valve; determine needed action.
- 42.02 Perform control valve operating pressure and flow tests; determine needed action.
- 42.03 Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic).

- 42.04 Identify causes of control valve leakage problems (internal/external); determine needed action.
- 42.05 Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed.

43.0 Actuators--The student will be able to:

**Comply with manufacturers' and industry accepted safety practices associated with equipment lock out/tag out; pressure line release; implement/support (blocked or resting on ground); and articulated cylinder devices/machinery safety locks.**

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