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**

PSAV – Career Preparatory	
Program Number	I470605
CIP Number	0647060501
Grade Level	30, 31
Standard Length	1800 hours
Teacher Certification	DIESEL MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031 – Bus and Truck Mechanics and Diesel Engine Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

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

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

Program Structure

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

The courses after the core (OCP-A) may be taken in any sequence. However, an individual must take the Diesel Engine Preventive Maintenance course (DIM0103). 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 postsecondary level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

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 hours	49-3031
B	DIM0102	Diesel Electrical and Electronics Technician	300 hours	49-3031
C	DIM0103	Diesel Engine Preventative Maintenance Technician	150 hours	49-3031
D	DIM0104	Diesel Engine Technician	300 hours	49-3031
E	DIM0105	Diesel Brakes Technician	300 hours	49-3031
F	DIM0106	Diesel Heating and Air Conditioning Technician	150 hours	49-3031
G	DIM0107	Diesel Steering and Suspension Technician	150 hours	49-3031
H	DIM0108	Diesel Drivetrain Technician	150 hours	49-3031
I	DIM0109	Diesel Hydraulics Technician	150 hours	49-3031

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Medium and Heavy Duty Bus and Truck program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Diagnose and repair general electrical systems.
08.0 Diagnose and repair battery systems.
09.0 Diagnose and repair starting systems.
10.0 Diagnose and repair charging systems.
11.0 Diagnose and repair lighting systems.
- 11.01 Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights.
- 11.02 Stoplights, turn signals, hazard lights, and back-up lights.

12.0 Diagnose and repair gauges and warning devices.
13.0 Diagnose and repair related electrical systems.
14.0 Diagnose and repair engine systems.
- 14.01 Engine
- 14.02 Fuel system
- 14.03 Air induction and exhaust system
- 14.04 Cooling system
- 14.05 Lubrication system

15.0 Diagnose and repair cab and hood systems.
- 15.01 Instruments and controls
- 15.02 Safety equipment
- 15.03 Hardware
- 15.04 Heating, ventilation, and air conditioning (HVAC)

16.0 Diagnose and repair electrical/electronic systems.
- 16.01 Battery and starting systems
- 16.02 Charging system
- 16.03 Lighting system

17.0 Diagnose and repair frame and chassis systems.
- 17.01 Air brakes
- 17.02 Hydraulic brakes
- 17.03 Drivetrain
- 17.04 Suspension and steering systems
- 17.05 Tires and wheels
- 17.06 Frame and fifth wheel

18.0 General engine diagnosis.

19.0 Cylinder head and valve train diagnosis and repair.
20.0 Engine block diagnosis and repair.
21.0 Lubrication systems diagnosis and repair.
22.0 Cooling system diagnosis and repair.
23.0 Air induction and exhaust systems diagnosis and repair.
24.0 Fuel system diagnosis and repair.
- 24.01 Fuel supply system diagnosis and repair.
- 24.02 Mechanical fuel injection diagnosis and repair.
- 24.03 Electronic fuel management system diagnosis and repair.

25.0 Diagnose and repair engine brakes.
26.0 Diagnose and repair air supply and service systems.
27.0 Diagnose and repair mechanical/foundation air brake systems.
28.0 Diagnose and repair parking brakes.
29.0 Diagnose and repair hydraulic systems.
30.0 Diagnose and repair mechanical/foundation hydraulic brake systems.
31.0 Diagnose and repair power assist units.
32.0 Diagnose and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC).
33.0 HVAC systems diagnosis, service, and repair.
34.0 A/C system and component diagnosis, service, and repair.
- 34.01 A/C system – general.
- 34.02 Compressor and clutch.
- 34.03 Evaporator, condenser, and related components.
- 34.04 Heating and engine cooling systems diagnosis, service, and repair.

35.0 Operating systems and related controls diagnosis and repair.
- 35.01 Electrical
- 35.02 Air/vacuum/mechanical
- 35.03 Refrigerant recovery, recycling, and handling.

36.0 Steering systems diagnosis and repair.
- 36.01 Steering column
- 36.02 Steering units
- 36.03 Steering linkage

37.0 Suspension systems diagnosis and repair.
38.0 Wheel alignment diagnosis, adjustment, and repair.
39.0 Wheels and tires diagnosis and repair.
40.0 Frame service and repair.
41.0 Clutch diagnosis and repair.
42.0 Transmission diagnosis and repair.
43.0 Driveshaft and universal joint diagnosis and repair.
44.0 Drive axle diagnosis and repair.
45.0 General hydraulic system diagnosis and repair.
46.0 Diagnose and repair hydraulic pumps.
47.0 Diagnose and repair hydraulic filtration/reservoirs (tanks).

48.0 Diagnose and repair hydraulic hoses, fittings, and connections.
49.0 Diagnose and repair hydraulic control valves.
50.0 Diagnose and repair hydraulic actuators.

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

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

CTE Standards and Benchmarks		Priority Number
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 and apply 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	
e.	Read a digital multimeter	

CTE Standards and Benchmarks		Priority Number
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.	

Florida Department of Education
Student Performance Standards

Course Number: DIM0102
Occupational Completion Point: B
Diesel Electrical and Electronics Technician – 300 Hours – SOC Code 49-3031

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

CTE Standards and Benchmarks		Priority Number
07.0	Diagnose and repair general electrical systems--The student will be able to:	
07.01	Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams.	P-1
07.02	Check continuity in electrical/electronic circuits using appropriate test equipment.	P-1
07.03	Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM).	P-1
07.04	Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) and clamp-on ammeter.	P-1
07.05	Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM).	P-1
07.06	Find shorts, grounds, and opens in electrical/electronic circuits.	P-1
07.07	Diagnose parasitic (key-off) battery drain problems.	P-1
07.08	Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.	P-2
07.09	Inspect and test spike suppression diodes/resistors; replace as needed.	P-3
08.0	Diagnose and repair battery systems--The student will be able to:	
08.01	Perform battery load test; determine needed action.	P-1
08.02	Determine battery state of charge using an open circuit voltage test.	P-2
08.03	Inspect, clean, and service battery; replace as needed.	P-2
08.04	Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.	P-2
08.05	Charge battery using slow or fast charge method as appropriate.	P-2
08.06	Inspect, test, and clean battery cables and connectors; repair or replace as needed.	P-1

CTE Standards and Benchmarks			Priority Number
	08.07	Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures.	P-1
	08.08	Perform battery capacitance test; determine needed action.	P-2
09.0	Diagnose and repair starting systems--The student will be able to:		
	09.01	Perform starter current draw test; determine needed action.	P-3
	09.02	Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	P-1
	09.03	Inspect, test, and replace components (key switch, push button and/or magnetic switch) and wires in the starter control circuit.	P-2
	09.04	Inspect, test, and replace starter relays and solenoids/switches.	P-2
	09.05	Remove and replace starter; inspect flywheel ring gear or flex plate.	P-3
10.0	Diagnose and repair charging systems--The student will be able to:		
	10.01	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
	10.02	Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action.	P-1
	10.03	Inspect, adjust, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.	P-1
	10.04	Perform charging system voltage and amperage output test; determine needed action.	P-1
	10.05	Perform charging circuit voltage drop tests; determine needed action.	P-1
	10.06	Remove and replace alternator.	P-3
	10.07	Inspect, repair, or replace connectors and wires in the charging circuit.	P-2
	10.08	Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action.	P-1
11.0	Diagnose and repair lighting systems		
	11.01	Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights--The student will be able to:	
		11.01.1 Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.	P-1
		11.01.2 Test, aim, and replace headlights.	P-1
		11.01.3 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed.	P-1
		11.01.4 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
		11.01.5 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

CTE Standards and Benchmarks			Priority Number
	11.01.6	Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed.	P-2
	11.01.7	Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.	P-1
11.02	Stoplights, turn signals, hazard lights, and back-up lights--The student will be able to:		
	11.02.1	Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed.	P-1
	11.02.2	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
	11.02.3	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
12.0	Diagnose and repair gauges and warning devices--The student will be able to:		
	12.01	Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action.	
	12.02	Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action.	P-1
	12.03	Diagnose the cause of data bus-driven gauge malfunctions; determine needed action.	P-2
	12.04	Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed.	P-2
	12.05	Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed.	P-2
	12.06	Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.	P-2
13.0	Diagnose and repair related electrical systems--The student will be able to:		
	13.01	Diagnose the cause of constant, intermittent, or no horn operation; determine needed action.	P-2
	13.02	Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed.	P-2
	13.03	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	P-2
	13.04	Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed.	P-2
	13.05	Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed.	P-2
	13.06	Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed.	P-3
	13.07	Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed.	P-3
	13.08	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

CTE Standards and Benchmarks		Priority Number
13.09	Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed.	P-3
13.10	Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action.	P-3
13.11	Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed.	P-3
13.12	Inspect block heaters; determine needed repairs.	P-2
13.13	Inspect and test cruise control electrical components; repair or replace as needed.	P-3
13.14	Inspect and test engine cooling fan electrical control components; repair or replace as needed.	P-2
13.15	Diagnose cause of data buss communication problems; determine needed action.	P-3

Florida Department of Education
Student Performance Standards

Course Number: DIM0103
Occupational Completion Point: C
Diesel Engine Preventative Maintenance Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Engine Preventative Maintenance Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study engine system, cab and hood systems, electrical/electronic systems, frame and chassis systems diagnostics, service, and repair.

CTE Standards and Benchmarks			Priority Number
14.0	Diagnose and repair engine systems		
14.01	Engine--The student will be able to:		
14.01.1		Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed.	P-1
14.01.2		Inspect vibration damper.	P-1
14.01.3		Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.	P-1
14.01.4		Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off).	P-1
14.01.5		Inspect engine mounts for looseness and deterioration.	P-1
14.01.6		Check engine for oil, coolant, air, fuel and exhaust leaks (Engine Running).	P-1
14.01.7		Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM).	P-1
14.02	Fuel system--The student will be able to:		
14.02.1		Check fuel tanks, mountings, lines, caps, and vents.	P-1
14.02.2		Inspect throttle linkages and return springs.	P-1
14.02.3		Drain water from fuel system.	P-1
14.02.4		Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.	P-1
14.03	Air induction and exhaust system--The student will be able to:		
14.03.1		Check exhaust system mountings for looseness and damage.	P-1
14.03.2		Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system if equipped.	P-1

CTE Standards and Benchmarks			Priority Number
	14.03.3	Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks.	P-1
	14.03.4	Inspect turbocharger for leaks; check mountings and connections.	P-1
	14.03.5	Check operation of engine compression/exhaust brake.	P-1
	14.03.6	Service or replace air filter as needed; check and reset air filter restriction indicator.	P-1
14.04	Cooling system--The student will be able to:		
	14.04.1	Check operation of fan clutch.	P-1
	14.04.2	Inspect radiator (including air flow restriction, leaks, and damage) and mountings.	P-1
	14.04.3	Inspect fan assembly and shroud.	P-1
	14.04.4	Pressure test cooling system and radiator cap.	P-1
	14.04.5	Inspect coolant hoses and clamps.	P-1
	14.04.6	Inspect coolant recovery system.	P-1
	14.04.7	Check coolant for contamination, supplemental coolant additives (SCA) concentration, and protection level (freeze point).	P-1
	14.04.8	Service coolant filter/conditioner.	P-1
	14.04.9	Inspect water pump for leaks and bearing play.	P-1
14.05	Lubrication system--The student will be able to:		
	14.05.1	Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.	P-1
	14.05.2	Take an engine oil sample.	P-1
15.0	Diagnose and repair cab and hood systems		
15.01	Instruments and controls--The student will be able to:		
	15.01.1	Inspect key condition and operation of ignition switch.	P-1
	15.01.2	Check warning indicators.	P-1
	15.01.3	Check instruments; record oil pressure and system voltage.	P-1
	15.01.4	Check mechanical, electronic, and emergency shut down operation.	P-1
	15.01.5	Check mechanical and electronic engine speed controls.	P-1
	15.01.6	Check heater, ventilation, and air conditioning (HVAC) controls.	P-1
	15.01.7	Check operation of all accessories.	P-1

CTE Standards and Benchmarks			Priority Number
	15.01.8	Using diagnostic tool or on-board diagnostic system; extract engine monitoring information.	P-1
15.02	Safety equipment--The student will be able to:		
	15.02.1	Check operation of electric/air horns and back-up warning devices.	P-1
	15.02.2	Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals.	P-1
	15.02.3	Inspect seat belts and sleeper restraints.	P-1
	15.02.4	Inspect wiper blades and arms.	P-1
15.03	Hardware--The student will be able to:		
	15.03.1	Check wiper and washer operation.	P-1
	15.03.2	Inspect windshield glass for cracks or discoloration; check sun visor.	P-1
	15.03.3	Check seat condition, operation, and mounting.	P-1
	15.03.4	Check door glass and window operation.	P-1
	15.03.5	Inspect steps and grab handles.	P-1
	15.03.6	Inspect mirrors, mountings, brackets, and glass.	P-1
	15.03.7	Record all observed physical damage.	P-1
	15.03.8	Lubricate all cab and hood grease fittings.	P-1
	15.03.9	Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.	P-1
	15.03.10	Inspect cab mountings, hinges, latches, linkages and ride height; service as needed.	P-1
	15.03.11	Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed.	P-1
15.04	Heating, ventilation, and air conditioning (HVAC)--The student will be able to:		
	15.04.1	Inspect A/C condenser and lines for condition and visible leaks; check mountings.	P-1
	15.04.2	Inspect A/C compressor and lines for condition and visible leaks; check mountings.	P-1
	15.04.3	Check A/C system condition and operation; check A/C monitoring system, if applicable.	P-1
	15.04.4	Check HVAC air inlet filters and ducts; service as needed.	P-1
16.0	Diagnose and repair electrical/electronic systems		
16.01	Battery and starting systems--The student will be able to:		
	16.01.1	Inspect battery box(es), cover(s), and mountings.	P-1

CTE Standards and Benchmarks			Priority Number
	16.01.2	Inspect battery hold-downs, connections, cables, and cable routing; service as needed.	P-1
	16.01.3	Check/record battery state-of-charge (open circuit voltage) and condition.	P-1
	16.01.4	Perform battery test (load and/or capacitance).	P-1
	16.01.5	Inspect starter, mounting, and connections.	P-1
	16.01.6	Engage starter; check for unusual noises, starter drag, and starting difficulty.	P-1
16.02	Charging system--The student will be able to:		
	16.02.1	Inspect alternator, mountings, wiring and wiring routing; determine needed action.	P-1
	16.02.2	Perform alternator current output test.	P-1
	16.02.3	Perform alternator voltage output test.	P-1
16.03	Lighting system--The student will be able to:		
	16.03.1	Check operation of interior lights; determine needed action.	P-1
	16.03.2	Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action.	P-1
	16.03.3	Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action.	P-1
17.0	Diagnose and repair frame and chassis systems		
17.01	Air brakes--The student will be able to:		
	17.01.1	Check parking brake operation.	P-1
	17.01.2	Record air governor cut-out setting (psi).	P-1
	17.01.3	Check air drier drain valve operation.	P-1
	17.01.4	Check air system for leaks (brakes released).	P-1
	17.01.5	Check air system for leaks (brakes applied).	P-1
	17.01.6	Test one-way and double-check valves.	P-1
	17.01.7	Check low air pressure warning devices.	P-1
	17.01.8	Check air governor cut-in pressure.	P-1
	17.01.9	Check emergency (spring) brake control/modulator valve, if applicable.	P-1
	17.01.10	Check tractor protection valve.	P-1
	17.01.11	Test air pressure build-up time.	P-1
	17.01.12	Inspect coupling air lines, holders, and gladhands.	P-1

CTE Standards and Benchmarks		Priority Number
17.01.13	Check brake chambers and air lines for secure mounting and damage.	P-1
17.01.14	Service air drier.	P-1
17.01.15	Inspect and record brake lining/pad condition, thickness, and contamination.	P-1
17.01.16	Inspect and record condition of brake drums/rotors.	P-1
17.01.17	Check operation of brake manual slack adjusters; adjust as needed.	P-1
17.01.18	Check operation and adjustment of brake automatic slack adjusters.	P-1
17.01.19	Lubricate all brake component grease fittings.	P-1
17.01.20	Check condition and operation of hand brake (trailer) control valve.	P-1
17.01.21	Perform antilock brake system (ABS) operational system self-test.	P-1
17.01.22	Drain air tanks and check for contamination.	P-1
17.01.23	Check condition of pressure relief (safety) valves.	P-1
17.02	Hydraulic brakes--The student will be able to:	
17.02.1	Check master cylinder fluid level and condition.	P-1
17.02.2	Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.	P-1
17.02.3	Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.	P-1
17.02.4	Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift).	P-1
17.02.5	Inspect wheel cylinders/calipers for leakage and damage.	P-1
17.02.6	Inspect power brake booster(s), hoses; and check/control valves; check power brake booster, reservoir fluid level and condition.	P-1
17.02.7	Inspect and record brake lining/pad condition and thickness, and contamination.	P-1
17.02.8	Inspect and record condition of brake drums/rotors.	P-1
17.02.9	Adjust drum brakes.	P-1
17.03	Drivetrain--The student will be able to:	
17.03.1	Check operation of clutch, clutch brake, and gearshift.	P-1
17.03.2	Check clutch linkage/cable for looseness or binding, if applicable.	P-1
17.03.3	Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.	P-1
17.03.4	Check clutch adjustment; adjust as needed.	P-1
17.03.5	Check transmission case, seals, filter, hoses, and cooler for cracks and leaks.	P-1

CTE Standards and Benchmarks		Priority Number
17.03.6	Inspect transmission breather.	P-1
17.03.7	Inspect transmission mounts.	P-1
17.03.8	Check transmission oil level, type, and condition.	P-1
17.03.9	Inspect U-joints, yokes, drive lines, and center bearings for looseness, damage, and proper phasing.	P-1
17.03.10	Inspect axle housing(s) for cracks and leaks.	P-1
17.03.11	Inspect axle breather(s).	P-1
17.03.12	Lubricate all drivetrain grease fittings.	P-1
17.03.13	Check drive axle(s) oil level, type, and condition.	P-1
17.03.14	Change drive axle(s) oil and filter; check and clean magnetic plugs.	P-1
17.03.15	Check two-speed axle unit operation and oil level.	P-1
17.03.16	Change transmission oil and filter; check and clean magnetic plugs.	P-1
17.03.17	Check interaxle differential lock operation.	P-1
17.03.18	Check range shift operation.	P-1
17.04	Suspension and steering systems--The student will be able to:	
17.04.1	Check steering wheel operation for free play or binding.	P-1
17.04.2	Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level.	P-1
17.04.3	Change power steering fluid and filter.	P-1
17.04.4	Inspect steering gear for leaks and secure mounting.	P-1
17.04.5	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
17.04.6	Check king pin wear.	P-1
17.04.7	Check wheel bearings for looseness and noise.	P-1
17.04.8	Check oil level and condition in all non-drive hubs; check for leaks.	P-1
17.04.9	Remove and inspect wheel bearings; reassemble and adjust.	P-1
17.04.10	Inspect springs, hangers, shackles, spring U-bolts, and insulators.	P-1
17.04.11	Inspect shock absorbers for leaks and secure mounting.	P-1
17.04.12	Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.	P-1

CTE Standards and Benchmarks		Priority Number
17.04.13	Check and record suspension ride height.	P-1
17.04.14	Lubricate all suspension and steering grease fittings.	P-1
17.04.15	Check toe adjustment.	P-1
17.04.16	Check tandem axle alignment and spacing.	P-1
17.04.17	Check axle locating components (radius, torque, and/or track rods).	P-1
17.05	Tires and wheels--The student will be able to:	
17.05.1	Inspect tires for irregular wear patterns and proper mounting of directional tires.	P-1
17.05.2	Inspect tires for cuts, cracks, bulges, and sidewall damage.	P-1
17.05.3	Inspect valve caps and stems; replace as needed.	P-1
17.05.4	Measure and record tread depth; probe for imbedded debris.	P-1
17.05.5	Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications.	P-1
17.05.6	Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed.	P-1
17.05.7	Retorque lugs in accordance with manufacturer's specifications.	P-1
17.05.8	Inspect wheels and spacers for cracks or damage.	P-1
17.05.9	Check tire matching (diameter and tread) on dual tire installations.	P-1
17.06	Frame and fifth wheel--The student will be able to:	
17.06.1	Inspect fifth wheel mounting bolts, air lines, and locks.	P-1
17.06.2	Test operation of fifth wheel locking device; adjust if necessary.	P-1
17.06.3	Check mud flaps and brackets.	P-1
17.06.4	Check pintle hook assembly and mounting.	P-1
17.06.5	Lubricate all fifth wheel grease fittings and plate.	P-1
17.06.6	Inspect frame and frame members for cracks and damage.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0104
Occupational Completion Point: D
Diesel Engine Technician – 300 Hours – SOC Code 49-3031

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

CTE Standards and Benchmarks		Priority Number
18.0	General engine diagnosis--The student will be able to:	
18.01	Inspect fuel, oil, and coolant levels and condition, and consumption; determine needed action.	P-1
18.02	Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action.	P-1
18.03	Interpret engine noises; determine needed action.	P-2
18.04	Observe engine exhaust smoke color and quantity; determine needed action.	P-1
18.05	Perform air intake system restriction and leakage tests; determine needed action.	P-1
18.06	Perform intake manifold pressure (boost) test; determine needed action.	P-1
18.07	Perform exhaust back pressure test; determine needed action.	P-2
18.08	Perform crankcase pressure test; determine needed action.	P-1
18.09	Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.	P-1
18.10	Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action.	P-1
18.11	Diagnose engine vibration problems; determine needed action.	P-2
18.12	Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action.	P-1
18.13	Perform cylinder compression test; determine needed action.	P-3
19.0	Cylinder head and valve train diagnosis and repair--The student will be able to:	
19.01	Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly.	P-1
19.02	Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action.	P-1

CTE Standards and Benchmarks		Priority Number
19.03	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
19.04	Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action.	P-3
19.05	Measure valve head height relative to deck, valve face-to-seat contact; determine needed action.	P-3
19.06	Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action.	P-3
19.07	Inspect and adjust valve bridges (crossheads) and guides; perform needed action.	P-2
19.08	Reassemble cylinder head.	P-3
19.09	Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash.	P-2
19.10	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
19.11	Inspect cam followers; perform needed action.	P-2
19.12	Adjust valve clearance.	P-1
20.0	Engine block diagnosis and repair--The student will be able to:	
20.01	Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings.	P-1
20.02	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
20.03	Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action.	P-3
20.04	Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action.	P-2
20.05	Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion).	P-2
20.06	Inspect in-block camshaft bearings for wear and damage; determine needed action.	P-3
20.07	Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play.	P-3
20.08	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
20.09	Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play.	P-2
20.10	Inspect, install, and time gear train; measure gear backlash; determine needed action.	P-3
20.11	Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action.	P-2
20.12	Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons.	P-2
20.13	Assemble pistons and connecting rods; install in block; install rod bearings and check clearances.	P-2

CTE Standards and Benchmarks		Priority Number
	20.14 Check condition of piston cooling jets (nozzles); determine needed action.	P-3
	20.15 Inspect and measure crankshaft vibration damper; determine needed action.	P-3
	20.16 Inspect, install, and align flywheel housing.	P-3
	20.17 Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.	P-3
21.0	Lubrication systems diagnosis and repair--The student will be able to:	
	21.01 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action.	P-1
	21.02 Check engine oil level, condition, and consumption; determine needed action.	P-1
	21.03 Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action.	P-3
	21.04 Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.	P-3
	21.05 Inspect, clean, and test oil cooler and components; determine needed action.	P-3
	21.06 Inspect turbocharger lubrication system; determine needed action.	P-2
	21.07 Determine proper lubricant and perform oil and filter change.	P-1
22.0	Cooling system diagnosis and repair--The student will be able to:	
	22.01 Check engine coolant type, level, condition, and consumption; determine needed action.	P-1
	22.02 Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action.	P-2
	22.03 Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.	P-1
	22.04 Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.	P-2
	22.05 Test coolant for freeze protection and additive package concentration; adjust as needed.	P-1
	22.06 Recover, flush, and refill with recommended coolant/additive package; bleed cooling system.	P-1
	22.07 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.	P-1
	22.08 Inspect water pump and hoses; replace as needed.	P-1
	22.09 Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action.	P-1
	22.10 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.	P-2
22.0	Air induction and exhaust systems diagnosis and repair--The student will be able to:	
	23.01 Inspect turbocharger(s), wastegate, and piping systems; determine needed action.	P-2

CTE Standards and Benchmarks			Priority Number
23.02	Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed.		P-1
23.03	Remove and reinstall turbocharger/wastegate assembly.		P-2
23.04	Inspect intake manifold, gaskets, and connections; replace as needed.		P-3
23.05	Inspect, clean, and test charge air cooler assemblies; replace as needed.		P-2
23.06	Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed.		P-2
23.07	Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.		P-2
24.0	Fuel system diagnosis and repair		
24.01	Fuel supply system diagnosis and repair--The student will be able to:		
	24.01.1	Check fuel level, quality, and consumption; determine needed action.	P-1
	24.01.2	Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.	P-1
	24.01.3	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
	24.01.4	Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.	P-1
	24.01.5	Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.	P-1
24.02	Mechanical fuel injection diagnosis and repair--The student will be able to:		
	24.02.1	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
	24.02.2	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
	24.02.3	Inspect and adjust throttle control linkage; determine needed action.	P-3
	24.02.4	Inspect air/fuel ratio control systems; determine needed action.	P-3
	24.02.5	Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action.	P-3
	24.02.6	Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed.	P-3
24.03	Electronic fuel management system diagnosis and repair--The student will be able to:		
	24.04.1	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

CTE Standards and Benchmarks			Priority Number
	24.04.2	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
	24.04.3	Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).	P-1
	24.04.4	Inspect and replace electrical connector terminals, seals, and locks.	P-2
	24.04.5	Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed.	P-1
	24.04.6	Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters.	P-1
	24.04.7	Inspect, test, and adjust electronic unit injectors (EUI); determine needed action.	P-2
	24.04.8	Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable).	P-2
	24.04.9	Perform cylinder contribution test utilizing recommended electronic diagnostic tool.	P-1
	24.04.10	Perform engine timing sensor calibration (if applicable).	P-3
	24.04.11	Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action.	P-2
	24.04.12	Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI) high pressure oil supply and control system; determine needed action.	P-2
	24.04.13	Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action.	P-2
	24.04.14	Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action.	P-2
	24.04.15	Perform on-engine inspections and tests on common rail type injection systems; determine needed action.	P-3
25.0	Diagnose and repair engine brakes--The student will be able to:		
	25.01	Inspect and adjust engine compression/exhaust brakes; determine needed action.	P-2
	25.02	Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed.	P-3
	25.03	Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed.	P-3

Florida Department of Education
Student Performance Standards

Course Number: DIM0105
Occupational Completion Point: E
Diesel Brakes Technician – 300 Hours – SOC Code 49-3031

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

CTE Standards and Benchmarks		Priority Number
Air Brakes Diagnosis and Repair		
26.0	Diagnose and repair air supply and service systems--The student will be able to:	
26.01	Diagnose poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determine needed action.	P-1
26.02	Check air system build-up time; determine needed action.	P-1
26.03	Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action.	P-1
26.04	Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed.	P-1
26.05	Inspect compressor drive gear and coupling; replace as needed.	P-3
26.06	Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.	P-2
26.07	Inspect and test system pressure controls: governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings; replace as needed.	P-2
26.08	Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed.	P-1
26.09	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
26.10	Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed.	P-1
26.11	Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed.	P-1
26.12	Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed.	P-1
26.13	Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.	P-1
26.14	Inspect and test brake relay valve; replace as needed.	P-1
26.15	Inspect and test quick release valves; replace as needed.	P-1

CTE Standards and Benchmarks		Priority Number
26.16	Inspect and test front and rear axle limiting (proportioning) valves; replace as needed.	P-3
26.17	Inspect and test tractor protection valve; replace as needed.	P-1
26.18	Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed.	P-1
26.19	Inspect and test low pressure warning devices, wiring, and connectors; replace as needed.	P-1
26.20	Inspect and test air pressure gauges, lines, and fittings; replace as needed.	P-2
27.0	Diagnose and repair mechanical/foundation air brake systems--The student will be able to:	
27.01	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
27.02	Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed.	P-1
27.03	Inspect and service manual and automatic slack adjusters; perform needed action.	P-1
27.04	Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs; replace as needed.	P-1
27.05	Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs.	P-3
27.06	Inspect and measure brake shoes, linings, or pads; perform needed action.	P-1
27.07	Inspect and measure brake drums or rotors; perform needed action.	P-1
28.0	Diagnose and repair parking brakes--The student will be able to**:**	
28.01	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
28.02	Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed.	P-1
28.03	Inspect and test parking (spring) brake application and release valve; replace as needed.	P-2
28.04	Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations.	P-1
Hydraulic Brakes Diagnosis and Repair		
29.0	Diagnose and repair hydraulic systems--The student will be able to:	
29.01	Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action.	P-1
29.02	Check and adjust brake pedal pushrod length.	P-3
29.03	Inspect and test master cylinder for internal/external leaks and damage; replace as needed.	P-1
29.04	Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed.	P-1
29.05	Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed.	P-2

CTE Standards and Benchmarks		Priority Number
29.06	Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed.	P-2
29.07	Inspect and clean wheel cylinders; replace as needed.	P-1
29.08	Inspect and clean disc brake caliper assemblies; replace as needed.	P-1
29.09	Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type.	P-1
29.10	Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed.	P-1
30.0	Diagnose and repair mechanical/foundation hydraulic brake systems--The student will be able to:	
30.01	Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action.	P-1
30.02	Inspect and measure brake drums and rotors; perform needed action.	P-1
30.03	Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action.	P-1
30.04	Inspect and measure disc brake pads/linings; inspect mounting hardware; perform needed action.	P-1
30.05	Check parking brake operation; inspect parking brake applications and holding devices; adjust and replace as needed.	P-1
31.0	Diagnose and repair power assist units--The student will be able to:	
31.01	Diagnose poor stopping problems caused by the brake assist (booster) system; determine needed action.	P-2
31.02	Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type.	P-2
31.03	Check emergency (back-up, reserve) brake assist system.	P-2
32.0	Diagnose and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC)--The student will be able to:	
32.01	Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action.	P-1
32.02	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
32.03	Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action.	P-1
32.04	Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action.	P-1
32.05	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
32.06	Bleed the ABS hydraulic circuits following manufacturers' procedures.	P-2

CTE Standards and Benchmarks		Priority Number
32.07	Observe automatic traction control (ATC) warning light operation; determine needed action.	P-3
32.08	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

Florida Department of Education
Student Performance Standards

Course Number: DIM0106
Occupational Completion Point: F
Diesel Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Heating and Air Conditioning Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of HVAC, and A/C systems.

CTE Standards and Benchmarks			Priority Number
33.0	HVAC systems diagnosis, service, and repair--The student will be able to:		
	33.01 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action.		P-1
	33.02 Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action.		P-1
	33.03 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
34.0	A/C system and component diagnosis, service, and repair		
	34.01 A/C system - general--The student will be able to:		
	34.01.1	Diagnose the cause of temperature control problems in the A/C system; determine needed action.	P-1
	34.01.2	Identify refrigerant type and check for contamination; determine needed action.	P-2
	34.01.3	Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action.	P-1
	34.01.4	Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action.	P-1
	34.01.5	Perform A/C system leak test; determine needed action.	P-1
	34.01.6	Evacuate A/C system using appropriate equipment.	P-1
	34.01.7	Internally clean contaminated A/C system components and hoses.	P-2
	34.01.8	Charge A/C system with refrigerant.	P-1
	34.01.9	Identify lubricant type needed for system application.	P-1
	34.02 Compressor and clutch--The student will be able to:		
	34.02.1	Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action.	P-1

CTE Standards and Benchmarks		Priority Number
34.02.2	Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices.	P-2
34.02.3	Inspect, and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment.	P-1
34.02.4	Inspect, test, service, and replace A/C compressor clutch components or assembly.	P-3
34.02.5	Inspect and correct A/C compressor lubricant level (if applicable).	P-2
34.02.6	Inspect, test, and replace A/C compressor.	P-2
34.02.7	Inspect, repair, or replace A/C compressor mountings and hardware.	P-2
34.03	Evaporator, condenser, and related components--The student will be able to:	
34.03.1	Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses.	P-1
34.03.2	Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action.	P-1
34.03.3	Inspect A/C condenser for proper air flow.	P-1
34.03.4	Inspect and test A/C system condenser and mountings; determine needed action.	P-2
34.03.5	Inspect and replace receiver/drier or accumulator/drier.	P-1
34.03.6	Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action.	P-3
34.03.7	Inspect and replace orifice tube.	P-1
34.03.8	Inspect and test cab/sleeper evaporator core; determine needed action.	P-3
34.03.9	Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter.	P-1
34.03.10	Identify and inspect A/C system service ports (gauge connections); determine needed action.	P-1
34.03.11	Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action.	P-2
34.04	Heating and engine cooling systems diagnosis, service, and repair--The student will be able to:	
34.04.1	Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action.	P-1
34.04.2	Diagnose window fogging problems; determine needed action.	P-1
34.04.3	Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action.	P-2
34.04.4	Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action.	P-1
34.04.5	Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action.	P-1

CTE Standards and Benchmarks			Priority Number
	34.04.6	Inspect water pump for leaks and bearing play; determine needed action.	P-2
	34.04.7	Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs.	P-2
	34.04.8	Recover, flush and refill with recommended coolant/additive package; bleed cooling system.	P-1
	34.04.9	Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.	P-2
	34.04.10	Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action.	P-2
	34.04.11	Inspect and flush heater core; determine needed action.	P-2
35.0	Operating systems and related controls diagnosis and repair		
	35.01	Electrical--The student will be able to:	
	35.01.1	Diagnose the cause of failures in HVAC electrical control systems; determine needed action.	P-1
	35.01.2	Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action.	P-2
	35.01.3	Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action.	P-2
	35.01.4	Inspect and test A/C-related electronic engine control systems; determine needed action.	P-2
	35.01.5	Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors wiring, and protection devices; determine needed action.	P-2
	35.01.6	Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action.	P-3
	35.01.7	Inspect and test HVAC system electrical control panel assemblies; determine needed action.	P-3
	35.02	Air/vacuum/mechanical--The student will be able to:	
	35.02.1	Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action.	P-1
	35.02.2	Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action.	P-3
	35.02.3	Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action.	P-3
	35.02.4	Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action.	P-3
	35.02.5	Inspect and test HVAC system vacuum reservoir(s), check valve(s), and restrictors; determine needed action.	P-3
	35.02.6	Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action.	P-3

CTE Standards and Benchmarks		Priority Number
NOTE: Tasks 1 through 5 should be accomplished in accordance with published EPA and appropriate SAE "J" standards for R-12, R- 1234YF, R-134a, and EPA approved refrigerant blends.		
35.03	Refrigerant recovery, recycling, and handling--The student will be able to:	
35.03.1	Maintain and verify correct operation of certified equipment.	P-1
35.03.2	Identify refrigerant types by label or use of a refrigerant identifier and recover A/C system refrigerant.	P-1
35.03.3	Recycle refrigerant.	P-1
35.03.4	Handle, label, and store refrigerant.	P-1
35.03.5	Test recycled refrigerant for non-condensable gases.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0107
Occupational Completion Point: G
Diesel Steering and Suspension Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Steering and Suspension Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of steering, suspension, wheel alignment, wheels, tires, and frame systems.

CTE Standards and Benchmarks			Priority Number
36.0	Steering systems diagnosis and repair		
	36.01	Steering column--The student will be able to:	
	36.01.1	Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action.	P-1
	36.01.2	Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action.	P-1
	36.01.3	Check and adjust cab mounting and ride height.	P-3
	36.01.4	Center the steering wheel as needed.	P-1
	36.01.5	Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures.	P-1
	36.02	Steering units--The student will be able to:	
	36.02.1	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
	36.02.2	Determine recommended type of power steering fluid; check level and condition; determine needed action.	P-1
	36.02.3	Flush and refill power steering system; purge air from system.	P-2
	36.02.4	Perform power steering system pressure, temperature, and flow tests; determine needed action.	P-2
	36.02.5	Inspect, service, or replace power steering reservoir including filter, seals, and gaskets.	P-2
	36.02.6	Inspect, and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.	P-1
	36.02.7	Inspect, replace as required, power steering pump drive gear and coupling.	P-3
	36.02.8	Inspect, adjust, or replace power steering pump, mountings, and brackets.	P-3

CTE Standards and Benchmarks			Priority Number
	36.02.9	Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings.	P-3
	36.02.10	Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system).	P-3
	36.02.11	Inspect, adjust, repair, or replace integral type power steering gear and mountings.	P-1
	36.02.12	Adjust manual and automatic steering gear poppet/relief valves.	P-2
36.03	Steering linkage--The student will be able to:		
	36.03.1	Inspect and align pitman arm; replace as needed.	P-1
	36.03.2	Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed.	P-1
	36.03.3	Inspect steering arm and levers, and linkage pivot joints; replace as needed.	P-1
	36.03.4	Inspect clamps and retainers on cross tube/relay rod/centerline/tie rod; position or replace as needed.	P-1
	36.03.5	Check and adjust wheel stops.	P-1
	36.03.6	Lubricate steering linkage joints as needed.	P-1
37.0	Suspension systems diagnosis and repair--The student will be able to:		
	37.01	Inspect front axles, U-bolts, and nuts; determine needed action.	P-1
	37.02	Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action.	P-1
	37.03	Inspect shock absorbers, bushings, brackets, and mounts; replace as needed.	P-1
	37.04	Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action.	P-1
	37.05	Inspect torque arms, bushings, and mounts; determine needed action.	P-1
	37.06	Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action.	P-1
	37.07	Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed.	P-3
	37.08	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
	37.09	Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed.	P-1
	37.10	Measure vehicle ride height; determine needed action.	P-1
	37.11	Diagnose rough ride problems; determine needed action.	P-3
38.0	Wheel alignment diagnosis, adjustment, and repair--The student will be able to:		

CTE Standards and Benchmarks		Priority Number
38.01	Diagnose vehicle wandering, pulling, shimmy, hard steering and off-center steering wheel problem(s); adjust and repair as needed.	P-1
38.02	Check camber; determine needed action.	P-2
38.03	Check caster; adjust as needed.	P-2
38.04	Check toe; adjust as needed.	P-1
38.05	Check rear axle(s) alignment (thrust line/centerline) and tracking; adjust or repair as needed.	P-2
38.06	Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action.	P-3
38.07	Check front axle alignment (centerline); adjust or repair as needed.	P-2
39.0	Wheels and tires diagnosis and repair--The student will be able to:	
39.01	Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action.	P-1
39.02	Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action.	P-2
40.0	Frame service and repair--The student will be able to:	P-1
40.01	Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action.	P-1
40.02	Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.	P-1
40.03	Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs.	P-1
40.04	Inspect, install, or repair frame hangers, brackets, and crossmembers in accordance with manufacturers' recommended procedures.	P-3
40.05	Inspect, repair or replace pintle hooks and draw bars.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0108
Occupational Completion Point: H
Diesel Drivetrain Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Drivetrain Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of clutch, transmission, driveshaft, universal joint, and drive axle systems.

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

CTE Standards and Benchmarks		Priority Number
41.0	Clutch diagnosis and repair--The student will be able to:	
41.01	Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.	P-1
41.02	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
41.03	Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.	P-2
41.04	Inspect, adjust, lubricate or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.	P-1
41.05	Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc.	P-2
41.06	Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.	P-1
41.07	Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action.	P-1
41.08	Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms.	P-2
41.09	Inspect and replace pilot bearing.	P-1
41.10	Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action.	P-1
41.11	Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action.	P-1
41.12	Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action.	P-1

CTE Standards and Benchmarks		Priority Number
42.0	Transmission diagnosis and repair--The student will be able to:	
42.01	Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action.	P-1
42.02	Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action.	P-2
42.03	Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers.	P-2
42.04	Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.	P-1
42.05	Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action.	P-3
42.06	Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed.	P-1
42.07	Check transmission fluid level and condition; determine needed service; add proper type of lubricant.	P-1
42.08	Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.	P-2
42.09	Remove and reinstall transmission.	P-1
42.10	Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed.	P-3
42.11	Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed.	P-3
42.12	Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed.	P-3
42.13	Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed.	P-3
42.14	Inspect and/or replace reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable).	P-3
42.15	Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed.	P-3
42.16	Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed.	P-3
42.17	Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed.	P-3
42.18	Inspect transmission oil filters and coolers; replace as needed.	P-2
42.19	Inspect mechanical and electronic speedometer components; determine needed action.	P-2
42.20	Inspect and adjust power take-off (PTO) assemblies, controls, and shafts; perform needed action.	P-3
42.21	Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed.	P-1
42.22	Inspect and test transmission temperature gauge sending unit/sensor; determine needed action.	P-2

CTE Standards and Benchmarks		Priority Number
42.23	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
42.24	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
42.25	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
42.26	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
42.27	Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, switches, displays and indicators, wiring harnesses.	P-2
42.28	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
43.0	Driveshaft and universal joint diagnosis and repair--The student will be able to:	
43.01	Diagnose driveshaft and universal joint noise and vibration problems; determine needed action.	P-1
43.02	Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes.	P-1
43.03	Inspect and replace driveshaft center support bearings and mounts; determine needed action.	P-1
43.04	Measure and adjust drive line angles.	P-1
44.0	Drive axle diagnosis and repair--The student will be able to:	
44.01	Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action.	P-2
44.02	Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals.	P-1
44.03	Check drive axle fluid level and condition; determine needed service; add proper type of lubricant.	P-1
44.04	Remove and replace differential carrier assembly.	P-2
44.05	Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings.	P-3
44.06	Inspect and replace components of locking differential case assembly.	P-3
44.07	Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action.	P-3
44.08	Measure ring gear runout; determine needed action.	P-3

CTE Standards and Benchmarks		Priority Number
44.09	Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings.	P-3
44.10	Measure and adjust drive pinion bearing preload.	P-3
44.11	Measure and adjust drive pinion depth.	P-3
44.12	Measure and adjust side bearing preload and ring gear backlash.	P-3
44.13	Check and interpret ring gear and pinion tooth contact pattern; determine needed action.	P-3
44.14	Inspect, adjust, or replace ring gear thrust block/bolt.	P-3
44.15	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
44.16	Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors.	P-3
44.17	Inspect power divider (inter-axle differential) assembly; determine needed action.	P-3
44.18	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
44.19	Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters.	P-3
44.20	Inspect and replace drive axle shafts.	P-1
44.21	Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action.	P-1
44.22	Diagnose drive axle for wheel bearing noise and damage; perform needed action.	P-1
44.23	Inspect and test drive axle temperature gauge sending unit/sensor; determine needed action.	P-2
44.24	Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0109
Occupational Completion Point: I
Diesel Hydraulics Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Hydraulics Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of hydraulic, pumps, filtration/reservoir, hoses, fittings, connectors, control valves, and actuator systems.

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.

CTE Standards and Benchmarks		Priority Number
45.0	General hydraulic system diagnosis and repair--The student will be able to:	
45.01	Identify system type (closed and open) and verify proper operation.	P-1
45.02	Read and interpret system diagrams and schematics.	P-1
45.03	Perform system temperature, pressure, flow, and cycle time tests; determine needed action.	P-1
45.04	Verify placement of equipment /component safety labels and placards; determine needed action.	P-1
46.0	Diagnose and repair hydraulic pumps--The student will be able to:	
46.01	Identify system fluid type.	P-1
46.02	Identify causes of pump failure, unusual pump noises, and temperature, flow, and leakage problems; determine needed action.	P-2
46.03	Determine pump type, rotation, and drive system.	P-2
46.04	Remove and install pump; prime and/or bleed system.	P-2
46.05	Inspect pump inlet for restrictions and leaks; determine needed action.	P-2
46.06	Inspect pump outlet for restrictions and leaks; determine needed action.	P-2

CTE Standards and Benchmarks		Priority Number
47.0	Diagnose and repair hydraulic filtration/reservoirs (tanks)--The student will be able to:	
47.01	Identify type of filtration system; verify filter application and flow direction.	P-1
47.02	Service filters and breathers.	P-1
47.03	Identify causes of system contamination; determine needed action.	P-2
47.04	Take a hydraulic oil sample.	P-2
47.05	Check reservoir fluid level and condition; determine needed action.	P-1
47.06	Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines.	P-2
48.0	Diagnose and repair hydraulic hoses, fittings, and connections--The student will be able to:	
48.01	Diagnose causes of component leakage, damage, and restriction; determine needed action.	P-2
48.02	Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed.	P-1
48.03	Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination.	P-2
48.04	Inspect and replace fitting seals and sealants.	P-2
49.0	Diagnose and repair hydraulic control valves--The student will be able to:	
49.01	Pressure test system safety relief valve; determine needed action.	P-2
49.02	Perform control valve operating pressure and flow tests; determine needed action.	P-2
49.03	Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic).	P-2
49.04	Identify causes of control valve leakage problems (internal/external); determine needed action.	P-2
49.05	Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed.	P-1
50.0	Diagnose and repair hydraulic 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.	
50.01	Identify actuator type (single/double acting, multi-stage/telescopic, and motors).	P-1
50.02	Identify the cause of seal failure; determine needed repairs.	P-2
50.03	Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs.	P-2
50.04	Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action.	P-2
50.05	Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures.	P-2

CTE Standards and Benchmarks	Priority Number
50.06 Inspect actuators for dents, cracks, damage, and leakage; determine needed action.	P-2
50.07 Purge and/or bleed system in accordance with manufacturers' recommended procedures.	P-1

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

NOTE: This program has been daggered for deletion with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, no new students may be enrolled in this program. Students already enrolled in the program may, at the District or Institution discretion, continue taking courses in the program until completion. The replacement enrollment option for students is Power Equipment Technologies (T410300).

PSAV – Career Preparatory	
Program Number	I470606
CIP Number	0647060600
Grade Level	30,31
Standard Length	1200 hours
Teacher Certification	GASENG RPR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3053 – Outdoor Power Equipment and Other Small Engine Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 8 Language: 8 Reading: 8

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.

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

Program Structure

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

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 hours	49-3053
B	SER0700	Clerk Parts	100 hours	49-3053
C	SER0171	Installer Repairer	200 hours	49-3053
D	SER0341	Helper, Mechanic and Repairer	150 hours	49-3053
E	SER0161 SER0162	Small Engine Mechanic 1 Small Engine Mechanic 2	325 hours 325 hours	49-3053

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 industry-related math skills.
06.0 Demonstrate proficiency in acceptable employee behavior.
07.0 Demonstrate proficiency in parts inventory identification and repair order processing.
08.0 Perform basic fuel system services.
09.0 Perform basic engine service and minor repairs.
10.0 Perform basic power transfer system and engine controls adjustments.
11.0 Perform power transfer system service.
12.0 Service and repair lubrication systems.
13.0 Perform basic electrical system service.
14.0 Service and repair cooling and exhaust systems.
15.0 Diagnose, repair and recondition basic engine components.
16.0 Apply industry-related science to small gas engine service.
17.0 Service and repair starting systems.
18.0 Perform basic tune-up service.
19.0 Diagnose and repair ignition systems.
20.0 Service, repair and adjust engine controls.
21.0 Diagnose service and repair electrical systems.
22.0 Demonstrate proficiency in repairing and maintaining basic two-stroke cycle engines.
23.0 Demonstrate proficiency in repairing and maintaining basic four-stroke cycle engines.
24.0 Demonstrate proficiency in repairing engine interior components.
25.0 Demonstrate proficiency in diagnosing and repairing power transfer systems.
26.0 Demonstrate applied communications skills.
27.0 Demonstrate proficiency in servicing, repairing and adjusting specific types of engines.

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

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

Florida Department of Education
Student Performance Standards

Course Number: SER0700
Occupational Completion Point: B
Clerk Parts – 100 Hours – SOC Code 49-3053

CTE Standards and Benchmarks	
05.0	Demonstrate industry-related math skills--The student will be able to:
05.01	Measure tolerance(s) millimeters and inches.
05.02	Perform metric to SAE (and SAE to metric) conversions.
06.0	Demonstrate proficiency in acceptable employee behavior--The student will be able to:
06.01	Explain the effects of chemical/substance abuse.
06.02	Identify principles of stress management.
06.03	Identify and define career opportunities in the industry.
06.04	Explain and identify acceptable work ethics.
06.05	Explain acceptable dress standards.
06.06	Identify and demonstrate proper customer relations skills.
06.07	Identify principles of time management.
06.08	Identify and define payroll deductions (taxes, insurance, and social security) and employee benefits.
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.

Florida Department of Education
Student Performance Standards

Course Number: SER0171
Occupational Completion Point: C
Installer Repairer – 200 Hours – SOC Code 49-3053

CTE Standards and Benchmarks	
08.0	Perform basic fuel system service--The student will be able to:
08.01	Service air filters.
08.02	Service or replace fuel filters.
08.03	Determine and use correct fuel and fuel mixtures.
09.0	Perform basic engine service and minor repairs--The student will be able to:
09.01	Identify types of engines.
09.02	Identify engine assemblies and systems.
09.03	Service crankcase breathers.
09.04	Identify types and ratios of two-cycle mix oils and their application to specific types of equipment.
09.05	Install spark plug(s).
09.06	Inspect and test fusible links, circuit breakers and fuses; replace as needed.
10.0	Perform basic power transfer system and engine controls adjustments--The student will be able to:
10.01	Inspect and measure drive belts and chains.
10.02	Install drive belts and chains.
10.03	Identify power transfer system components.
10.04	Sharpen and balance blades.
10.05	Remove and replace or install blades correctly.

Florida Department of Education
Student Performance Standards

Course Number: SER0341
Occupational Completion Point: D
Helper, Mechanic and Repairer – 150 Hours – SOC Code 49-3053

CTE Standards and Benchmarks	
11.0	Perform power transfer system service--The student will be able to:
11.01	Replace drive components.
11.02	Remove and repair clutches.
12.0	Service and repair lubrication systems--The student will be able to:
12.01	Replace seals and gaskets.
12.02	Identify lubrication systems.
12.03	Service and repair lubrication systems.
13.0	Perform basic electrical system service--The student will be able to:
13.01	Identify ignition systems and components.
13.02	Perform basic electrical tests.
13.03	Replace electrical system components.
13.04	Identify and test batteries.
13.05	Service batteries according to manufacturer's specifications.
14.0	Service and repair cooling and exhaust systems--The student will be able to:
14.01	Service air cooling fins and screens.
14.02	Service two-cycle exhaust systems.
14.03	Service four-cycle exhaust systems.
15.0	Repair and recondition basic engine components--The student will be able to:
15.01	Identify types of internal combustion engines.
15.02	Explain the basic principles of the operation of types of internal combustion engines.
15.03	Locate engine serial and model numbers.

CTE Standards and Benchmarks	
15.04	Identify engine assemblies and systems.
15.05	Disassemble engines.
15.06	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
16.0	Apply industry-related science to small gas engine service--The student will be able to:
16.01	Explain how temperature extremes, chemical reactions, and moisture content affect mechanical systems.
16.02	Draw conclusions or make inferences from data.
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	Measure pressure in terms of pounds per square inch (PSI).
17.0	Service and repair starting systems--The student will be able to:
17.01	Service and repair manual starting systems.
17.02	Service and repair electrical starting systems.
17.03	Test and service battery starting systems.
18.0	Perform basic tune-up service--The student will be able to:
18.01	Drain and refill oil, if applicable.
18.02	Identify spark plugs and special applications.
18.03	Remove, adjust and replace spark plugs.
18.04	Service filters and breathers.
18.05	Adjust ignition systems timing.
18.06	Inspect and service power transfer system.
18.07	Adjust valves.

Florida Department of Education
Student Performance Standards

Course Number: SER0161
Occupational Completion Point: E (1 of 2)
Small Engine Mechanic – 325 Hours – SOC Code 49-3053

CTE Standards and Benchmarks	
19.0	Diagnose and repair ignition systems--The student will be able to:
19.01	Identify and diagnose ignition systems and components.
19.02	Repair magneto ignition systems.
19.03	Repair solid-state ignition systems.
19.04	Repair battery ignition systems.
19.05	Repair impulse ignition systems.
19.06	Diagnose magneto ignition systems.
19.07	Diagnose solid-state ignition systems.
19.08	Diagnose battery ignition systems.
19.09	Diagnose impulse ignition systems.
20.0	Service, repair and adjust engine controls--The student will be able to:
20.01	Service, repair and adjust governor speed controls.
20.02	Service, repair and adjust remote speed controls.
20.03	Service, repair and adjust manual start-stop controls.
20.04	Service, repair and adjust electrical start-stop controls.
20.05	Service, repair and adjust zone systems.
20.06	Service, repair and adjust blade clutch controls.
20.07	Service, repair and adjust chain brake systems.
20.08	Comply with the Consumer Protection Act (CPA) for three-second stops.
20.09	Comply with the CPA for interlocks.
20.10	Comply with the CPA for blade tip speed.

CTE Standards and Benchmarks	
	20.11 Read and interpret CPA rules and regulations.
21.0	Diagnose, service, repair and adjust electrical systems--The student will be able to:
	21.01 Operate electrical testing instruments.
	21.02 Perform electrical system tests.
	21.03 Replace electrical system components.
	21.04 Diagnose electrical system components.
	21.05 Service, repair and adjust charging systems.
22.0	Demonstrate proficiency in repairing and maintaining basic two-stroke cycle engines--The student will be able to:
	22.01 Remove, clean and inspect piston rods and assemblies.
	22.02 Measure out-of-round piston and cylinder.
	22.03 Check the total bearing surface of connecting rod bearings.
	22.04 Measure piston skirts and ring grooves.
	22.05 Measure the piston ring gap in the cylinder bore.
	22.06 Install piston pins according to manufacturer's specifications.
	22.07 Check rod and piston assembly alignment.
	22.08 Install rings on pistons.
	22.09 Install piston rod assemblies.
	22.10 Check needle bearings.
	22.11 Inspect crankshafts and install seals.
	22.12 Inspect, clean and/or replace reed valves.
	22.13 Reassemble engines.
	22.14 Diagnose head problems by use of the visual inspection method.
	22.15 Diagnose head problems by use of the compression tester method.
	22.16 Diagnose head problems by use of the cylinder air pressure method.
	22.17 Measure and check crankshafts with a micrometer to diagnose engine problems.
23.0	Demonstrate proficiency in repairing and maintaining basic four-stroke cycle engines--The student will be able to:
	23.01 Clean and inspect heads for cracks, warpage and damaged spark plug threads.

CTE Standards and Benchmarks	
23.02	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
23.03	Grind valve seats and reface valves.
23.04	Check and inspect springs for free height, distortion and installed height.
23.05	Adjust valve lash.
23.06	Remove and inspect camshafts and lifters.
23.07	Measure camshafts.
23.08	Service camshaft bearings.
23.09	Clean and inspect lifters for wear.
23.10	Time valve drive assemblies.
23.11	Remove piston from rods assemblies.
23.12	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
23.13	Check piston pins and bosses for wear.
23.14	Measure piston ring lands width, out-of-round and taper.
23.15	Measure the piston ring gap in the cylinder bore.
23.16	Install and fit piston pins.
23.17	Check rod and piston assembly alignment.
23.18	Remove and replace rod bearings.
23.19	Hone and clean cylinders.
23.20	Install rings on pistons.
23.21	Measure and check crankshafts with a micrometer.
23.22	Check for end play.
23.23	Check the bearing bore with a telescoping gage using special tools provided by the engine manufacturer.
23.24	Reassemble engines.
23.25	Install oil seals.
23.26	Diagnose valve and head problems by use of the visual inspection method, i.e., water contamination vs. fuel-rich or lean carburetor adjustment.
23.27	Diagnose valve and head problems by use of the compression tester method.
23.28	Diagnose valve and head problems by use of the cylinder air pressure method.

CTE Standards and Benchmarks	
	23.29 Diagnose valve and head problems by use of the stethoscope method.

Course Number: SER0162
Occupational Completion Point: E (2 of 2)
Small Engine Mechanic – 325 Hours – SOC Code 49-3053

CTE Standards and Benchmarks	
24.0	Demonstrate proficiency in repairing engine interior components--The student will be able to:
	24.01 Service, repair and adjust valve systems.
	24.02 Service, repair and adjust rings, bores and pistons.
	24.03 Service, repair and adjust crankshafts and bearings.
	24.04 Service, repair and adjust rods.
	24.05 Service, repair and adjust lubrication systems.
	24.06 Service, repair and adjust internal governor.
	24.07 Service, repair and adjust internal components timing.
	24.08 Assemble complete engines to manufacturer's specifications.
	24.09 Diagnose causes of component failures to determine if they are due to friction, resulting from poor lubrication or contaminated fuel or to normal wear.
25.0	Demonstrate proficiency in diagnosing and repairing power transfer systems--The student will be able to:
	25.01 Repair manual transmissions.
	25.02 Repair differentials.
	25.03 Identify power transfer system components.
	25.04 Replace drive components.
	25.05 Remove and replace hydraulic pump systems.
	25.06 Diagnose manual transmissions.
	25.07 Diagnose differentials.
	25.08 Diagnose drive components.
26.0	Demonstrate applied communication skills--The student will be able to:
	26.01 Draw and interpret electrical, electronic, hydraulic and mechanical schematics.

CTE Standards and Benchmarks	
	26.02 Write reports.
	26.03 Maintain test logs.
	26.04 Make equipment failure reports.
	26.05 Specify and requisition components.
	26.06 Compose technical letters
	26.07 Write formal reports of laboratory experiences.
27.0	Demonstrate proficiency in servicing, repairing and adjusting specific types of engines--The student will be able to:
	27.01 Service, repair and adjust lawn and garden equipment.
	27.02 Service, repair and adjust commercial golf course equipment.
	27.03 Service, repair and adjust commercial industrial equipment.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	I470608
CIP Number	0647060405
Grade Level	30, 31
Standard Length	1800 hours
Teacher Certification	AUTO IND @7 %7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023 – Automotive Service Technicians and Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

NOTE: It is recommended that students complete **OCP-A (Automobile Services Assistor)** and/or demonstrate mastery of the outcomes in **OCP-A (Automobile Services Assistor)** prior to enrolling in additional Automotive Service Technology courses. **The sequence of OCP's, after completing and/or demonstrating mastery of OCP-A (Automobile Services Assistor), is at the discretion of the instructor.**

For institutions using this framework, the National Automotive Technicians Education Foundation (NATEF) highly recommends the Master Automotive Service Technology (MAST) program Certification/Accreditation. Florida Statute (F.S.) 1004.925 – Automotive service technology education programs; certification. – requires all automotive service technology education programs shall be industry certified in accordance with rules adopted by the State Board of Education.

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

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

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

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

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Automotive Service Technology program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry.
02.0 Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
03.0 Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.
04.0 Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems.
05.0 Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles.
06.0 Explain and apply proficiently the diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive.
07.0 Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires.
08.0 Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.
09.0 Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.
10.0 Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.
11.0 Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.

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

Course Description:
The Automotive Service Assistor course prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study equipment skills, safety regulations, routine maintenance, and customer service.

Abbreviations:
ASE = Required Supplemental Tasks

For every task in Automotive Services Assistor course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

CTE Standards and Benchmarks		Priority Number
01.0	Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry--The student will be able to:	
01.01	Identify and apply general shop safety rules and procedures, EPA and OSHA standards.	ASE
01.02	Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.	
01.03	Research, identify, and interpret the Federal 'Workers Right To Know Law'.	
01.04	Identify and use appropriate emergency first aid procedures.	
01.05	Utilize and demonstrate safe procedures for handling of tools and equipment.	ASE
01.06	Identify and use proper placement of floor jacks and jack stands.	ASE
01.07	Identify and use proper procedures for safe lift operation.	ASE
01.08	Utilize proper ventilation procedures for working within the lab/shop area.	ASE
01.09	Identify and use proper procedures for safe pit usage.	

CTE Standards and Benchmarks		Priority Number
01.10	Identify marked safety areas.	ASE
01.11	Identify the location and the types of fire extinguishers and other fire safety equipment.	ASE
01.12	Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment.	ASE
01.13	Identify the location and use of eye wash stations.	ASE
01.14	Identify the location of the posted evacuation routes.	ASE
01.15	Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	ASE
01.16	Identify and wear appropriate clothing for lab/shop activities.	ASE
01.17	Secure hair and jewelry for lab/shop activities.	ASE
01.18	Use proper handling procedures for automotive fluids.	
01.19	Identify and describe typical automotive lubricants and lubricant properties.	
01.20	Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.	
01.21	Identify and describe typical automotive seals and gaskets.	
01.22	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	ASE
01.23	Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.	
01.24	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)	ASE
01.25	Locate and demonstrate knowledge of material safety data sheets (MSDS).	ASE
02.0	Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry--The student will be able to:	
02.01	Identify tools and equipment and their appropriate usage in automotive applications.	ASE
02.02	Identify and use standard and metric measurement skills and designation.	ASE
02.03	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	ASE
02.04	Demonstrate proper use of precision-measuring tools (i.e. micrometer, digital/dial-indicator, digital/dial-caliper) and torque methods.	ASE
03.0	Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services --The student will be able to:	
03.01	Identify information needed and the service requested on a repair order.	ASE
03.02	Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.	
03.03	Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.	ASE

CTE Standards and Benchmarks		Priority Number
03.04	Demonstrate use of the three C's (Concern, Cause, and Correction).	ASE
03.05	Review vehicle service history.	ASE
03.06	Use computer and operate keyboard.	
03.07	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	ASE
03.08	Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.	
03.09	Determine the presence of a Tire Pressure Monitoring System (TPMS).	
03.10	Determine the presence of wheel locks.	
03.11	Determine the presence of an air suspension system.	
03.12	Check operation and status of instrument panel warning lights and gauges.	
03.13	Locate and use the Vehicle Identification Number (VIN).	
03.14	Locate and use vehicle information placards, decals, tags, as required.	
03.15	Locate and use paper and electronic manuals.	
03.16	Locate and use technical service bulletins (TSBs).	
03.17	Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.	
03.18	Use proper chemicals for cleaning and lubrication.	
03.19	Reset maintenance indicators.	
03.20	Verify status of instrument panel warning lights and gauges.	
03.21	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).	ASE
03.22	Inspect underhood area for leaks, damage, and unusual conditions.	
03.23	Determine fluid type requirements and identify fluid.	
03.24	Check engine oil level and condition; service as required.	
03.25	Check engine coolant level and condition; service as required.	
03.26	Check power steering fluid level and condition; service as required.	
03.27	Check brake fluid level and condition; service as required.	
03.28	Check hydraulic clutch fluid and condition; service as required.	
03.29	Check windshield washer fluid level and condition; service as required.	

CTE Standards and Benchmarks	Priority Number
03.30 Check automatic transmission fluid level and condition; service as required.	
03.31 Inspect undercar area for leaks, damage, and unusual conditions.	
03.32 Check differential/transfer case fluid level; note unusual conditions; service as required.	
03.33 Check manual transmission fluid level; note unusual conditions; service as required.	
03.34 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear.	
03.35 Lubricate driveline, suspension and steering systems.	
03.36 Inspect cooling system pipes and hoses for wear, damage, and proper routing.	
03.37 Change engine oil and filter.	
03.38 Replace inline fuel filters as applicable.	
03.39 Inspect and replace air filter.	
03.40 Inspect and replace cabin air filter.	
03.41 Inspect, replace and adjust drive belts; inspect tensioners and pulleys.	
03.42 Document observed damage, unusual conditions, and concerns.	
03.43 Visually inspect struts, springs, and related components.	
03.44 Visually inspect stabilizer bar, bushings, brackets, and links.	
03.45 Visually inspect springs, torsion bars, and related components.	
03.46 Visually inspect shock absorbers and related components.	
03.47 Visually inspect constant velocity (CV) axle shaft boots.	
03.48 Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).	
03.49 Identify nitrogen-filled tires.	
03.50 Inspect tires; inspect spare and mounting system; check and adjust tire pressure.	
03.51 Rotate tires according to recommendations.	
03.52 Balance wheel and tire assembly.	
03.53 Dismount, inspect, and remount tire on wheel.	
03.54 Repair tire according to industry standards.	
03.55 Reinstall wheel; torque wheel fasteners to specification.	
03.56 Check wheel bearings for play and other signs of wear.	

CTE Standards and Benchmarks	Priority Number
03.57 Perform a visual inspection of a brake drum system.	
03.58 Perform a visual inspection of a disc brake system.	
03.59 Check parking brake operation; check parking brake components for unusual conditions.	
03.60 Document damage, unusual conditions and concerns.	
03.61 Check wiper blades, inserts, and arms; replace wiper blades or inserts.	
03.62 Lubricate door latches and hinges.	
03.63 Inspect fuel cap and seal.	
03.64 Charge battery as needed.	
03.65 Inspect and clean battery hold-downs; repair or replace as needed.	
03.66 Inspect and clean battery and battery cable clamp connections.	
03.67 Perform battery, starting, and charging system tests using appropriate tester.	
03.68 Start vehicle using an auxiliary power supply.	
03.69 Maintain or restore electronic memory functions if required.	
03.70 Test and replace fuses; confirm proper circuit operation.	
03.71 Inspect and replace exterior and courtesy lamps.	
03.72 Document damage, unusual conditions, and concerns.	

Florida Department of Education
Student Performance Standards

Course Number: AER0110
Occupational Completion Point: B
Engine Repair Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Engine Repair Technician prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of general engine, cylinder heads, valve trains, engine block, lubrication, and cooling systems.

Abbreviations:
ER = Engine Repair

For every task in Engine Repair Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

ER Task List:	
	P-1 = 23
	P-2 = 17
	P-3 = 11
Total	**51**

CTE Standards and Benchmarks		**Priority Number**
04.0	Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems--The student will be able to:	
04.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1
04.02	Identify and interpret engine concern; determine necessary action.	
04.03	Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.	P-1
04.04	Verify operation of the instrument panel engine warning indicator.	P-1
04.05	Locate and interpret vehicle and major component identification numbers.	
04.06	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	P-1
04.07	Diagnose engine noises and vibrations; determine necessary action.	
04.08	Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action.	
04.09	Perform engine vacuum tests; determine necessary action.	

CTE Standards and Benchmarks		Priority Number
04.10	Perform cylinder power balance tests; determine necessary action.	
04.11	Remove and replace timing belt; verify correct camshaft timing.	P-1
04.12	Perform cylinder cranking and running compression tests; determine necessary action.	
04.13	Perform cylinder leakage tests; determine necessary action.	
04.14	Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.	P-3
04.15	Install engine covers using gaskets, seals and sealers as required.	P-1
04.16	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
04.17	Inspect, remove and replace engine mounts.	P-2
04.18	Identify hybrid vehicle internal combustion engine service precautions.	P-3
04.19	Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.	P-1
04.20	Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.	P-1
04.21	Inspect valve springs for squareness and free height comparison; determine necessary action.	P-3
04.22	Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action.	P-3
04.23	Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.	P-3
04.24	Inspect valves and valve seats; determine necessary action.	P-3
04.25	Check valve spring assembled height and valve stem height; determine necessary action.	P-3
04.26	Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.	P-2
04.27	Inspect valve lifters; determine necessary action.	P-2
04.28	Adjust valves (mechanical or hydraulic lifters).	P-1
04.29	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 valve timing components; verify correct camshaft timing.	P-1
04.30	Inspect and/or measure camshaft for run out, journal wear and lobe wear.	P-2
04.31	Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.	P-3
04.32	Establish camshaft position sensor indexing.	P-1
04.33	Remove, inspect, or replace crankshaft vibration damper (harmonic balancer).	P-2

CTE Standards and Benchmarks		Priority Number
04.34	Disassemble engine block; clean and prepare components for inspection and reassembly.	P-1
04.35	Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.	P-2
04.36	Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.	P-2
04.37	Deglaze and clean cylinder walls.	P-2
04.38	Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.	P-3
04.39	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
04.40	Inspect main and connecting rod bearings for damage and wear; determine necessary action.	P-2
04.41	Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.	P-3
04.42	Inspect and measure piston skirts and ring lands; determine necessary action.	P-2
04.43	Remove and replace piston pin.	
04.44	Determine piston-to-bore clearance.	P-2
04.45	Inspect, measure, and install piston rings.	P-2
04.46	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
04.47	Assemble engine block.	P-1
04.48	Perform oil pressure tests; determine necessary action.	P-1
04.49	Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.	P-2
04.50	Perform cooling system pressure and dye test to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core and gallery plugs; determine necessary action.	P-1
04.51	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.	P-1
04.52	Inspect and replace engine cooling and heater system hoses.	
04.53	Remove, inspect, and replace thermostat and gasket/seal.	P-1
04.54	Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.	P-1
04.55	Inspect, remove and replace water pump.	P-2
04.56	Remove and replace radiator.	P-2

CTE Standards and Benchmarks	Priority Number
04.57 Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.	P-1
04.58 Inspect auxiliary coolers; determine necessary action.	P-3
04.59 Inspect, test, and replace oil temperature and pressure switches and sensors.	P-2
04.60 Perform engine oil and filter change.	P-1
04.61 Identify causes of engine overheating.	P-1

Florida Department of Education
Student Performance Standards

Course Number: AER0257
Occupational Completion Point: C
Automatic Transmission and Transaxle Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automatic Transmission and Transaxle Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics, repair, service, and operation of automatic transmission/transaxles.

Abbreviations:
AT = Automatic Transmission/Transaxle

For every task in Automatic Transmission and Transaxle Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

AT Task List:	
P-1	**15**
P-2	**20**
P-3	**4**
Total	**39**

CTE Standards and Benchmarks		Priority Number
05.0	Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles --The student will be able to:	
05.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
05.02	Identify and interpret transmission/transaxle concern, differentiate between engine performance and transmission/transaxle concerns; determine necessary action.	P-1
05.03	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
05.04	Locate and interpret vehicle and major component identification numbers.	
05.05	Diagnose fluid loss and condition concerns; determine necessary action.	P-1
05.06	Check fluid level in a transmission or a transaxle equipped with a dipstick.	P-1
05.07	Check fluid level in a transmission or a transaxle not equipped with a dipstick.	P-1
05.08	Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
05.09	Perform stall test; determine necessary action.	P-3
05.10	Perform lock-up converter system tests; determine necessary action.	P-3
05.11	Diagnose noise and vibration concerns; determine necessary action.	P-2
05.12	Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.	P-1
05.13	Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).	P-2
05.14	Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.	P-1
05.15	Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.	P-2
05.16	Inspect for leakage; replace external seals, gaskets, and bushings.	P-2
05.17	Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses.	P-1
05.18	Diagnose electronic transmission control systems using a scan tool; determine necessary action.	
05.19	Inspect, replace, and align powertrain mounts.	P-2
05.20	Drain and replace fluids and filter(s).	P-1
05.21	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
05.22	Disassemble, clean, and inspect transmission/transaxle.	P-2
05.23	Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets).	P-2
05.24	Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action.	P-2
05.25	Assemble transmission/transaxle.	P-2
05.26	Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.	P-1
05.27	Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.	P-2
05.28	Install and seat torque converter to engage drive/splines.	
05.29	Inspect, measure, and reseal oil pump assembly and components.	P-2
05.30	Measure transmission/transaxle end play or preload; determine necessary action.	P-1
05.31	Inspect, measure, and replace thrust washers and bearings.	P-2
05.32	Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.	P-2

CTE Standards and Benchmarks		Priority Number
05.33	Inspect bushings; determine necessary action.	P-2
05.34	Inspect and measure planetary gear assembly components; determine necessary action.	P-2
05.35	Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action.	P-2
05.36	Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.	P-2
05.37	Inspect, measure, repair, adjust or replace transaxle final drive components.	P-2
05.38	Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action.	P-2
05.39	Measure clutch pack clearance; determine necessary action.	P-1
05.40	Air test operation of clutch and servo assemblies.	P-1
05.41	Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; determine necessary action.	P-2
05.42	Inspect bands and drums; determine necessary action.	
05.43	Describe the operational characteristics of a continuously variable transmission (CVT).	P-3
05.44	Describe the operational characteristics of a hybrid vehicle drive train.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0274
Occupational Completion Point: D
Manual Drivetrain and Axle Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Manual Drivetrain and Axle Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of drive train, clutch, transmission, transaxle, half shaft universal, constant-velocity joint, rear axle, ring and pinion gears, differential case assemble, limited slip differential, drive shaft, and four wheel drive/all-wheel drive.

Abbreviations:
MD = Manual Drivetrain and Axles

For every task in Manual Drivetrain and Axle Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

MD Task List:	
	P-1 = 17
	P-2 = 12
	P-3 = 20
Total	**49**

CTE Standards and Benchmarks		Priority Number
06.0	Explain and apply proficiently the diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive- -The student will be able to:	
06.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
06.02	Identify and interpret drive train concern; determine necessary action.	P-1
06.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
06.04	Check fluid condition; check for leaks; determine necessary action.	P-1
06.05	Locate and interpret vehicle and major component identification numbers.	
06.06	Diagnose fluid loss, level, and condition concerns; determine necessary action.	
06.07	Drain and refill manual transmission/transaxle and final drive unit.	P-1
06.08	Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
06.09	Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.	P-1
06.10	Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.	
06.11	Check and adjust clutch master cylinder fluid level; check for leaks.	P-1
06.12	Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).	P-1
06.13	Bleed clutch hydraulic system.	P-1
06.14	Inspect flywheel and ring gear for wear and cracks; determine necessary action.	P-1
06.15	Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.	
06.16	Measure flywheel run out and crankshaft end play; determine necessary action.	P-2
06.17	Remove and reinstall transmission/transaxle.	
06.18	Disassemble, inspect, clean, and reassemble internal transmission/transaxle components.	P-3
06.19	Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.	
06.20	Diagnose noise concerns through the application of transmission/transaxle powerflow principles.	P-2
06.21	Diagnose hard shifting and jumping out of gear concerns; determine necessary action.	P-2
06.22	Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.	P-2
06.23	Inspect, replace, and align powertrain mounts.	
06.24	Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.	
06.25	Remove and replace transaxle final drive.	
06.26	Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.	
06.27	Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.	
06.28	Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.	
06.29	Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.	P-3
06.30	Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.	P-3
06.31	Inspect lubrication devices (oil pump or slingers); perform necessary action.	
06.32	Inspect, test, and replace transmission/transaxle sensors and switches.	
06.33	Describe the operational characteristics of an electronically controlled manual transmission/transaxle.	P-3

CTE Standards and Benchmarks		Priority Number
06.34	Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.	P-1
06.35	Diagnose universal joint noise and vibration concerns; perform necessary action.	P-2
06.36	Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.	P-1
06.37	Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.	P-1
06.38	Inspect, service, and replace shaft center support bearings.	
06.39	Check shaft balance and phasing; measure shaft run out; measure and adjust driveline angles.	P-2
06.40	Diagnose noise and vibration concerns; determine necessary action.	
06.41	Inspect and replace companion flange and pinion seal; measure companion flange run out.	P-2
06.42	Inspect ring gear and measure run out; determine necessary action.	P-3
06.43	Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings.	P-3
06.44	Measure and adjust drive pinion depth.	P-3
06.45	Measure and adjust drive pinion bearing preload.	P-3
06.46	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-3
06.47	Check ring and pinion tooth contact patterns; perform necessary action.	P-3
06.48	Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.	P-3
06.49	Reassemble and reinstall differential case assembly; measure run out; determine necessary action.	P-3
06.50	Diagnose noise, slippage, and chatter concerns; determine necessary action.	P-3
06.51	Clean and inspect differential housing; check for leaks; inspect housing vent.	P-2
06.52	Check and adjust differential housing fluid level.	P-1
06.53	Drain and refill differential housing.	P-1
06.54	Inspect and reinstall limited slip differential components.	
06.55	Measure rotating torque; determine necessary action.	P-3
06.56	Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.	P-2
06.57	Inspect and replace drive axle wheel studs.	P-1
06.58	Remove and replace drive axle shafts.	P-1
06.59	Inspect and replace drive axle shaft seals, bearings, and retainers.	P-2

CTE Standards and Benchmarks		Priority Number
06.60	Measure drive axle flange run out and shaft end play; determine necessary action.	P-2
06.61	Diagnose noise and vibration concerns; determine necessary action.	P-2
06.62	Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.	P-3
06.63	Remove and reinstall transfer case.	
06.64	Disassemble, service, and reassemble transfer case and components.	P-3
06.65	Inspect front-wheel bearings and locking hubs; perform necessary action(s).	P-3
06.66	Check for leaks at drive assembly seals; check vents; check lube level.	P-3
06.67	Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.	P-3
06.68	Diagnose noise, vibration, and unusual steering concerns; determine necessary action.	P-3
06.69	Identify concerns related to variations in tire circumference and/or final drive ratios.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0453
Occupational Completion Point: E
Automotive Suspension and Steering Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automotive Suspension and Steering Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of general suspension, steering systems, front suspensions, rear suspensions, wheel alignment, and tires.

Abbreviations:
SS = Suspension and Steering

For every task in Automotive Suspension and Steering Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

SS Task List:	
P-1 =	**23**
P-2 =	**22**
P-3 =	**12**
Total	**57**

CTE Standards and Benchmarks		**Priority Number**
07.0	Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires –The student will be able to:	
07.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
07.02	Identify and interpret suspension and steering system concerns; determine necessary action.	P-1
07.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
07.04	Locate and interpret vehicle and major component identification numbers.	
07.05	Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1
07.06	Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1
07.07	Inspect, remove, and install upper and lower control arms, bushings, shafts, and rebound and jounce bumpers.	P-3
07.08	Inspect, remove and install strut rods and bushings.	P-3

CTE Standards and Benchmarks		Priority Number
07.09	Inspect, remove and install upper and/or lower ball joints (with or without wear indicators).	P-2
07.10	Inspect, remove and install steering knuckle assemblies.	P-3
07.11	Inspect, remove and install short and long arm suspension system coil springs and spring insulators.	P-3
07.12	Inspect, remove and install torsion bars and mounts.	P-3
07.13	Inspect, remove and install front stabilizer bar (sway bar) bushings, brackets, and links.	P-3
07.14	Inspect, remove and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.	P-3
07.15	Inspect, remove and install track bar, strut rods/radius arms and related mounts and bushings.	P-3
07.16	Inspect rear suspension system leaf spring(s), bushings, center pins/bolts and mounts.	P-1
07.17	Inspect, remove, and replace shock absorbers; inspect mounts and bushings.	P-1
07.18	Remove, inspect, and service or replace front and rear wheel bearings.	P-1
07.19	Describe the function of the power steering pressure switch.	P-3
07.20	Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concern; determine necessary action.	P-1
07.21	Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.	P-1
07.22	Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.	P-1
07.23	Check toe-out-on-turns (turning radius); determine necessary action.	P-2
07.24	Check SAI (steering axis inclination) and included angle; determine necessary action.	P-2
07.25	Check rear wheel thrust angle; determine necessary action.	P-1
07.26	Check for front wheel setback; determine necessary action.	P-2
07.27	Check front and/or rear cradle (sub-frame) alignment; determine necessary action.	P-3
07.28	Reset steering angle sensor.	P-2
07.29	Disable and enable supplemental restraint system (SRS).	P-1
07.30	Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).	P-1
07.31	Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.	P-2
07.32	Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.	P-2
07.33	Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; perform necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
07.34	Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.	P-2
07.35	Adjust non-rack and pinion worm bearing preload and sector lash.	
07.36	Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.	P-2
07.37	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.	P-2
07.38	Determine proper power steering fluid type; inspect fluid level and condition.	P-1
07.39	Flush, fill, and bleed power steering system.	P-2
07.40	Inspect for power steering fluid leakage; determine necessary action.	P-1
07.41	Remove, inspect, replace, and adjust power steering pump drive belt.	P-1
07.42	Remove and reinstall power steering pump.	P-2
07.43	Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.	P-2
07.44	Inspect and replace power steering hoses and fittings.	P-2
07.45	Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.	P-2
07.46	Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.	P-1
07.47	Test and diagnose components of electronically-controlled steering systems using a scan tool; determine necessary action.	P-3
07.48	Inspect electric power-assisted steering.	P-3
07.49	Identify hybrid vehicle power steering system electrical circuits and safety precautions.	P-2
07.50	Inspect tire condition; identify tire wear patterns; check of correct tire size and application (load and speed rating) and adjust air pressure; determine necessary action.	P-1
07.51	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	P-2
07.52	Rotate tires according to manufacturer’s recommendations.	P-1
07.53	Measure wheel, tire, axle flange, and hub run out; determine necessary action.	P-2
07.54	Diagnose tire pull problems; determine necessary action.	P-2
07.55	Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).	P-1
07.56	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	P-2
07.57	Reinstall wheel; torque lug nuts.	
07.58	Inspect tire and wheel assembly for air loss; perform necessary action.	P-1
07.59	Repair tire using internal patch.	P-1
07.60	Identify and test pressure monitor system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lambs.	P-2

CTE Standards and Benchmarks	Priority Number
07.61 Demonstrate knowledge of steps required to remove and replace sensor in a tire pressure monitoring system.	P-1

Florida Department of Education
Student Performance Standards

Course Number: AER0418
Occupational Completion Point: F
Automotive Brake System Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automotive Brake System Technician prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of brake systems, drum brakes, disc brakes, power assist units, electronic brakes, traction, and stability control.

Abbreviations:
BR = Brakes

For every task in Automotive Brake System Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

BR Task List:	
	P-1 = 34
	P-2 = 12
	P-3 = 11
Total	**57**

CTE Standards and Benchmarks		**Priority Number**
08.0	Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems--The student will be able to:	
08.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
08.02	Identify and interpret brake system concern; determine necessary action.	P-1
08.03	Describe procedures for performing a road test to check brake system operation; including an antilock brake system (ABS).	P-1
08.04	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
08.05	Install wheel and torque lug nuts.	P-1
08.06	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).	
08.07	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1
08.08	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
08.09	Check master cylinder for internal/external leaks and proper operation; determine necessary action.	P-1
08.10	Remove, bench bleed, and reinstall master cylinder.	P-1
08.11	Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P-3
08.12	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; check for loose fittings and supports; determine necessary action.	P-1
08.13	Replace brake lines, hoses, fittings, and supports.	P-2
08.14	Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	P-2
08.15	Select, handle, store, and fill brake fluids to proper level.	P-1
08.16	Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.	
08.17	Inspect, test, and/or replace components of brake warning light system.	P-3
08.18	Identify components of brake warning light system.	P-2
08.19	Bleed and/or flush brake system.	P-1
08.20	Test brake fluid for contamination.	P-1
08.21	Diagnose poor drum brake stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P-1
08.22	Remove, clean, inspect, and measure brake drums; determine necessary action.	P-1
08.23	Refinish brake drum and measure final drum diameter; compare with specifications.	P-1
08.24	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
08.25	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-2
08.26	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.	P-2
08.27	Install wheel, torque lug nuts, and make final checks and adjustments associated with drum brakes.	
08.28	Diagnose poor disk brake stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	P-1
08.29	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.	P-1
08.30	Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.	P-1
08.31	Remove, inspect, and replace pads and retaining hardware; determine necessary action.	P-1
08.32	Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.	
08.33	Lubricate and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	P-1

CTE Standards and Benchmarks		Priority Number
08.34	Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral run out; determine necessary action.	P-1
08.35	Remove and reinstall rotor.	P-1
08.36	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.	P-1
08.37	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.	P-1
08.38	Retract and re-adjust caliper piston on an integrated parking brake system.	P-3
08.39	Install wheel, torque lug nuts, and make final checks and adjustments associated with disc brakes.	
08.40	Check brake pad wear indicator; determine necessary action.	P-2
08.41	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.	P-1
08.42	Check brake pedal travel with, and without engine running to verify proper power booster operation.	P-2
08.43	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P-1
08.44	Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.	P-1
08.45	Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.	P-3
08.46	Measure and adjust master cylinder pushrod length.	P-3
08.47	Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.	P-3
08.48	Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.	P-1
08.49	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	P-2
08.50	Check parking brake operation and parking brake indicator light system; determine necessary action.	P-1
08.51	Check operation of brake stop light system.	P-1
08.52	Replace wheel bearing and race.	P-2
08.53	Inspect and replace wheel studs.	P-1
08.54	Remove and reinstall sealed wheel bearing assembly.	P-2
08.55	Identify and inspect electronic brake control system components; determine necessary action.	P-1
08.56	Identify traction control/vehicle stability control system components.	P-3
08.57	Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.	P-2
08.58	Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
08.59	Depressurize high-pressure components of the electronic brake control system.	P-3
08.60	Bleed the electronic brake control system hydraulic circuits.	P-1
08.61	Remove and install electronic brake control system electrical/electronic and hydraulic components.	
08.62	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).	P-3
08.63	Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).	P-3
08.64	Describe the operation of a regenerative braking system.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0360
Occupational Completion Point: G
Automotive Electrical/Electronic System Technician – 300 Hours – SOC Code 49-3023

Course Description:
The Automotive Electrical/Electronic System Technician prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of electrical/electronics, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.

Abbreviations:
EE = Electrical/Electronic Systems

For every task in Automotive Electrical/Electronic System Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

EE Task List:	
P-1 =	**36**
P-2 =	**14**
P-3 =	**8**
Total	**58**

CTE Standards and Benchmarks			Priority Number
09.0		Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems-- 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.	
	09.02	Identify and interpret electrical/electronic system concern; determine necessary action.	
	09.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
	09.04	Locate and interpret vehicle and major component identification numbers.	
	09.05	Diagnose and demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1
	09.06	Use wiring diagrams during diagnosis (troubleshooting) of electrical/electronic circuit problems.	P-1
	09.07	Demonstrate the proper use of a digital multimeter (DMM) when measuring source, voltage drop (including grounds), current flow, and resistance.	P-1
	09.08	Check operation of electrical circuits with a test light.	P-1

CTE Standards and Benchmarks		Priority Number
09.09	Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.	P-2
09.10	Check operation of electrical circuits using fused jumper wires.	P-1
09.11	Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-1
09.12	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.	P-1
09.13	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	P-1
09.14	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.	P-1
09.15	Replace electrical connectors and terminal ends.	P-1
09.16	Repair wiring harness.	P-1
09.17	Perform solder repair of electrical wiring.	P-1
09.18	Repair CAN/BUS wiring harness.	P-1
09.19	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.	
09.20	Perform battery state-of-charge test; determine necessary action.	P-1
09.21	Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.	P-1
09.22	Maintain or restore electronic memory functions.	P-1
09.23	Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.	P-1
09.24	Perform slow/fast battery charge according to manufacturer's recommendations.	P-1
09.25	Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.	P-1
09.26	Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.	P-3
09.27	Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.	P-1
09.28	Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	P-3
09.29	Perform battery conductance test; determine necessary action.	
09.30	Perform starter current draw tests; determine necessary action.	P-1
09.31	Perform starter circuit voltage drop tests; determine necessary action.	P-1
09.32	Inspect and test starter relays and solenoids; determine necessary action.	P-2
09.33	Remove and install starter in a vehicle.	P-1
09.34	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
09.35	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	P-2
09.36	Perform charging system output test; determine necessary action.	P-1
09.37	Diagnose (troubleshoot) charging system for the cause of undercharge, no-charge, and overcharge conditions.	P-1
09.38	Inspect, adjust, or replace generator (alternator) drive belts, check pulleys, and tensioners for wear; check pulley and belt alignment.	P-1
09.39	Remove, inspect, and re-install generator (alternator).	P-1
09.40	Perform charging circuit voltage drop test; determine necessary action.	P-1
09.41	Diagnose (troubleshoot) the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	P-1
09.42	Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving light); replace as needed.	P-1
09.43	Aim headlights.	P-2
09.44	Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.	
09.45	Identify system voltage and safety precautions associated with high intensity discharge headlights.	P-2
09.46	Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.	P-2
09.47	Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.	
09.48	Diagnose (troubleshoot) the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	P-2
09.49	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.	
09.50	Diagnose (troubleshoot) causes of incorrect horn operation; perform necessary action.	P-1
09.51	Diagnose (troubleshoot) causes of incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	P-2
09.52	Diagnose (troubleshoot) windshield washer problems; perform necessary action.	P-2
09.53	Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.	P-2
09.54	Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.	
09.55	Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.	P-2
09.56	Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action	P-3
09.57	Diagnose (troubleshoot) supplemental restraint system (SRS) concerns; determine necessary action.	P-2
09.58	Disable and enable an airbag system for vehicle service; verify indicator lamp operation.	P-1

CTE Standards and Benchmarks		Priority Number
09.59	Diagnose (troubleshoot) radio static and weak, intermittent, or no radio reception; determine necessary action.	P-3
09.60	Remove and reinstall door panel.	P-1
09.61	Diagnose (troubleshoot) body electronic system circuits using a scan tool; determine necessary action.	P-3
09.62	Check for module communication (including CAN/BUS systems) using a scan tool.	P-2
09.63	Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems.	P-3
09.64	Describe the operation of keyless entry/remote-start systems.	P-3
09.65	Verify operation of instrument panel gauges and warning /indicator lights; reset maintenance indicator.	P-1
09.66	Verify windshield wiper and washer operation, replace wiper blades.	P-1
09.67	Describe the process for software transfers, software updates, or flash reprogramming on electronic modules.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0172
Occupational Completion Point: H
Automotive Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automotive Heating and Air Conditioning Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.

Abbreviations:
HA = Heating and Air Conditioning

For every task in Automotive Heating and Air Conditioning Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

HA Task List:	
P-1 =	17
P-2 =	17
P-3 =	4
Total	38

CTE Standards and Benchmarks		Priority Number
10.0	Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling--The student will be able to:	
10.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
10.02	Identify and interpret heating and air conditioning problems; determine necessary action.	P-1
10.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
10.04	Locate and interpret vehicle and major component identification numbers.	
10.05	Performance test A/C system; identify problems.	P-1
10.06	Identify abnormal operating noises in the A/C system; determine necessary action.	P-2
10.07	Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings.	P-1
10.08	Leak test A/C system; determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
10.09	Inspect the condition of refrigerant oil removed from A/C system; determine necessary action.	P-2
10.10	Determine recommended oil and oil capacity for system application.	P-1
10.11	Using a scan tool, observe and record related HVAC data and trouble codes.	P-3
10.12	Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.	P-2
10.13	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.	P-1
10.14	Inspect, test, service or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.	P-2
10.15	Remove, inspect, and reinstall A/C compressor and mountings; determine recommended oil quantity.	P-2
10.16	Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.	P-2
10.17	Determine the need for an additional A/C system filter; perform necessary action.	P-3
10.18	Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.	P-2
10.19	Inspect A/C condenser for airflow restrictions; perform necessary action.	P-1
10.20	Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity.	P-2
10.21	Remove, inspect, and install expansion valve or orifice (expansion) tube.	P-1
10.22	Inspect evaporator housing water drain; perform necessary action.	P-1
10.23	Determine procedure to remove and reinstall evaporator; determine required oil quantity.	P-2
10.24	Remove, inspect, and reinstall condenser; determine required oil quantity.	P-2
10.25	Diagnose temperature control problems in the heater/ventilation system; (determine PCM) to interpret system operation; determine necessary action.	P-2
10.26	Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action.	
10.27	Inspect engine cooling and heater system hoses; perform necessary action.	P-1
10.28	Determine procedure to remove, inspect, and reinstall heater core.	P-2
10.29	Inspect, test, and replace thermostat and gasket/seal.	
10.30	Determine coolant condition and coolant type for vehicle application; drain and recover coolant.	
10.31	Flush system; refill system with recommended coolant; bleed system.	
10.32	Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.	
10.33	Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.	

CTE Standards and Benchmarks		Priority Number
10.34	Inspect and test heater control valve(s); perform necessary action.	P-2
10.35	Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.	P-1
10.36	Diagnose A/C compressor clutch control systems; determine necessary action.	P-2
10.37	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
10.38	Inspect and test A/C-heater control panel assembly; determine necessary action.	P-3
10.39	Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.	P-3
10.40	Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.	P-1
10.41	Identify the source of A/C system odors.	P-2
10.42	Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.	P-2
10.43	Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.	P-1
10.44	Identify and recover A/C system refrigerant.	P-1
10.45	Recycle, label, and store refrigerant.	P-1
10.46	Evacuate and charge A/C system; add refrigerant oil as required.	P-1

Florida Department of Education
Student Performance Standards

Course Number: AER0503
Occupational Completion Point: I
Automotive Engine Performance Technician – 300 Hours – SOC Code 49-3023

Course Description:
The Automotive Engine Performance Technician course prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.

Abbreviations:
EP = Engine Performance

For every task in Automotive Engine Performance Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

EP Task List:	
P-1	**21**
P-2	**17**
P-3	**9**
Total	**47**

CTE Standards and Benchmarks		Priority Number
11.0	Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems --The student will be able to:	
11.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
11.02	Identify and interpret engine performance concern; determine necessary action.	P-1
11.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
11.04	Locate and interpret vehicle and major component identification numbers.	
11.05	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	
11.06	Diagnose abnormal engine noise or vibration concerns; determine necessary action.	P-3
11.07	Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine necessary action.	P-2
11.08	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.	P-1
11.09	Perform cylinder power balance test; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
11.10	Perform cylinder cranking and running compression tests; determine necessary action.	P-1
11.11	Perform cylinder leakage test; determine necessary action.	P-1
11.12	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.	P-2
11.13	Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.	
11.14	Verify engine operating temperature; determine necessary action.	P-1
11.15	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.	
11.16	Verify correct camshaft timing.	P-1
11.17	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	P-1
11.18	Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.	P-1
11.19	Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action.	P-1
11.20	Check for module communication (including CAN/BUS systems) errors using a scan tool.	
11.21	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-2
11.22	Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1
11.23	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
11.24	Perform active tests of actuators using a scan tool; determine necessary action.	P-2
11.25	Describe the importance of running all OBDII monitors for repair verification.	P-1
11.26	Diagnose (troubleshoot) 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-2
11.27	Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.	
11.28	Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.	P-1
11.29	Remove and replace spark plugs; inspect secondary ignition components for wear and damage.	P-1
11.30	Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.	P-3
11.31	Diagnose (troubleshoot) 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-2

CTE Standards and Benchmarks		Priority Number
11.32	Check fuel for contaminants; determine necessary action.	P-2
11.33	Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.	P-1
11.34	Replace fuel filters.	P-1
11.35	Inspect, service or replace air filters, filter housing and intake duct work.	P-1
11.36	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.	P-2
11.37	Inspect and test fuel injectors.	P-2
11.38	Verify idle control operation.	P-1
11.39	Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform necessary action.	P-1
11.40	Inspect condition of exhaust system hangers, brackets, clamps and heat shields; repair or replace as needed.	P-1
11.41	Perform exhaust system back-pressure test; determine necessary action.	P-2
11.42	Check and refill diesel exhaust fluid (DEF).	P-3
11.43	Test the operation of turbocharger/supercharger systems; determine necessary action.	P-3
11.44	Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.	P-3
11.45	Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.	P-2
11.46	Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.	P-3
11.47	Diagnose emissions and driveability concerns caused by the secondary injection and catalytic converter systems; determine necessary action.	P-2
11.48	Inspect, test, service and replace components of the EGR system, including tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.	P-2
11.49	Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.	P-2
11.50	Inspect and test mechanical components of secondary air injection systems; perform necessary action.	
11.51	Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.	P-3
11.52	Inspect and test catalytic converter efficiency.	P-2
11.53	Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action.	P-2
11.54	Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
11.55	Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.	P-3
11.56	Adjust valves on engines with mechanical or hydraulic lifters.	
11.57	Remove and replace timing belt; verify correct camshaft timing.	
11.58	Remove and replace thermostat and gasket/seal.	
11.59	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.	
11.60	Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.	
11.61	Perform engine oil and filter change.	
11.62	Identify hybrid vehicle internal combustion engine service precautions.	

Additional Information

Laboratory Activities

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

Special Notes

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Aircraft Airframe Mechanics**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	I470612
CIP Number	0647060700
Grade Level	30, 31
Standard Length	1,440 hours
Teacher Certification	AIR MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3011 – Aircraft Mechanics and Service Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 10

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.

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

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The Aviation General Maintenance Technical Helper (AMT0700) course is the core course.

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 hours	49-3011
	AMT0710	Aviation Maintenance Technician with FAA Airframe Rating 1	480 hours	49-3011
B	AMT0711	Aviation Maintenance Technician with FAA Airframe Rating 2	480 hours	49-3011

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Aircraft Airframe Mechanics program can be found using the following link:

http://www.gpo.gov/fdsys/pkg/CFR-2012-title14-vol3/pdf/CFR-2012-title14-vol3-part147-appC.pdf

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 principles of basic physics.
11.0 Demonstrate the use of maintenance publications.
12.0 Interpret mechanic privileges and limitations.
13.0 Demonstrate appropriate communication skills.
14.0 Demonstrate employability skills as an Aviation General Maintenance Technician Helper.
15.0 Maintain wood structures.
16.0 Perform aircraft covering.
17.0 Apply aircraft finishes.
18.0 Repair sheet-metal and non-metallic structures.
19.0 Perform and identify proper welding.
20.0 Perform assembly and rigging.
21.0 Perform airframe inspection.
22.0 Maintain aircraft landing-gear systems.
23.0 Maintain hydraulic and pneumatic power systems.
24.0 Maintain cabin atmosphere control systems.
25.0 Maintain aircraft instrument systems.
26.0 Maintain communication and navigation systems.
27.0 Inspect and repair aircraft fuel systems.
28.0 Inspect and repair aircraft electrical systems.
29.0 Inspect and repair position and warning systems.
30.0 Maintain ice and rain control systems.
31.0 Inspect and repair aircraft fire-protection systems.
32.0 Demonstrate knowledge of Federal Aviation Administration Airframe licensing requirements.
33.0 Demonstrate employability skills as an Aviation Maintenance Technician with a FAA airframe rating.
34.0 Demonstrate an understanding of entrepreneurship related to opportunities in Aviation Airframe Maintenance occupations.

Florida Department of Education
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

Course Description:
The Aviation General Maintenance Technician Helper course prepares students for entry into the aviation industry. Students explore career opportunities and requirements of a professional aviation mechanic. Students study basic electricity, aircraft drawing, weight, balance, fluid lines, fittings, materials, processes, operations, services, cleaning, corrosion-control, math, forms, records, basic physics, maintenance publications, communication, and employability skills.

CTE Standards and Benchmarks		FAA FAR Part 147
01.0	Perform basic electricity skills--The student will be able to:	
01.01	Calculate and measure capacitance and inductance.	App. B, A, 1. Level 2
01.02	Calculate and measure electrical power.	App. B, A, 2. Level 2
01.03	Measure voltage, current, resistance, and continuity.	App. B, A, 3. Level 3
01.04	Determine the relationship of voltage, current, and resistance in electrical circuits.	App. B, A, 4. Level 3
01.05	Read and interpret aircraft electrical-circuit diagrams, including solid-state devices and logic functions.	App. B, A, 5. Level 3
01.06	Inspect and service batteries.	App. B, A, 6. 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.	App. B, B, 7. Level 2
02.02	Draw sketches of repairs and alterations.	App. B, B, 8. Level 3
02.03	Use blueprint information.	App. B, B, 9. Level 3
02.04	Use graphs and charts.	App. B, B, 10. Level 3
03.0	Demonstrate aircraft weight and balance skills--The student will be able to:	
03.01	Weigh aircraft.	App. B, C, 11. Level 2

CTE Standards and Benchmarks		FAA FAR Part 147
	03.02 Perform complete weight-and-balance check and record data.	App. B, C, 12. Level 3
	03.03 Properly configure aircraft for weighing and capable of setting up and using weighing equipment.	
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.	App. B, D, 13. Level 3
	04.02 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.	App. B, E, 14. Level 1
	05.02 Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections.	App. B, E, 15. Level 2
	05.03 Perform basic heat-testing processes.	App. B, E, 16. Level 1
	05.04 Identify and select aircraft hardware and materials.	App. B, E, 17. Level 3
	05.05 Inspect and check welds.	App. B, E, 18. Level 3
	05.06 Perform precision measurements.	App. B, E, 19. 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.	App. B, G, 20. Level 2
	06.02 Identify and select fuels.	App. B, G, 21. 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.	App. B, G, 22. Level 3
	07.02 Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. Understand metal strength limitations when removing corrosion.	App. B, G, 23. Level 3
08.0	Demonstrate mathematical skills--The student will be able to:	
	08.01 Extract roots and raise numbers to a given power.	App. B, H, 24. 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.	App. B, H, 25. Level 3
	08.03 Solve ratio, proportion, and percentage problems.	App. B, H, 26. Level 3
	08.04 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers.	App. B, H, 27. Level 3
09.0	Maintain forms and records--The student will be able to:	

CTE Standards and Benchmarks		FAA FAR Part 147
	09.01 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records.	App. B, I, 28. Level 3
	09.02 Complete required maintenance forms, records, and inspection reports.	App. B, I, 29. Level 3
10.0	Apply principles of basic physics--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.	App. B, J, 30. Level 2
	10.02 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
	10.03 Draw conclusions or make inferences from data.	
	10.04 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.	
	10.05 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.	
11.0	Demonstrate the use of maintenance publications--The student will be able to:	
	11.01 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.	App. B, K, 31. Level 3
	11.02 Read technical data.	App. B, K, 32. Level 3
12.0	Interpret mechanic privileges and limitations--The student will be able to:	
	12.01 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter.	App. B, L, 33. Level 3
	12.02 Identify the information in Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for Aviation Maintenance Technician (AMT) certification and ratings.	
	12.03 Identify the FAA requirements that must be satisfied in order to display the FAA Airframe and Powerplant license.	
13.0	Demonstrate appropriate communication skills--The student will be able to:	
	13.01 Write logical and understandable statements or phrases to accurately complete forms/invoices commonly used in business and industry.	
	13.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.	
	13.03 Read and follow written and oral instructions.	
	13.04 Answer and ask questions coherently and concisely.	
	13.05 Read critically by recognizing assumptions and implications and by evaluating ideas.	
	13.06 Demonstrate appropriate telephone/communication skills.	
14.0	Demonstrate employability skills as an Aviation General Maintenance Technician Helper--The student will be able to:	

CTE Standards and Benchmarks	FAA FAR Part 147
14.01 Conduct a job search.	
14.02 Secure information about a job.	
14.03 Identify documents that may be required when applying for a job position.	
14.04 Complete a job-application form correctly.	
14.05 Demonstrate job-interview skills.	
14.06 Identify appropriate responses to criticism from employer, supervisor, or other employees.	
14.07 Identify work habits for getting and keeping a job.	
14.08 Explain how to make job changes.	
14.09 Explain the purpose of the Right-to-Know" law.	

Florida Department of Education
Student Performance Standards

Course Number: AMT0710
Occupational Completion Point: B (1 of 2)
Aviation Maintenance Technician with FAA Airframe Rating 1 – 480 Hours – SOC Code 49-3011

Course Description:
The Aviation Maintenance Technician with FAA Airframe Rating (1) course is designed to build on the skills and knowledge students learned in the Aviation General Maintenance Technician Helper course. Students explore career opportunities and requirements of a professional aviation mechanic. Students study wood structures, aircraft covering, finishes, metallic and non-metallic surfaces, basic welding, assembly, rigging, airframe inspection, landing gear, hydraulic and pneumatic systems, atmosphere control, aircraft instruments, communication, and navigation systems.

CTE Standards and Benchmarks		FAA FAR Part 147
15.0	Maintain wood structures--The student will be able to:	
	15.01 Service and repair wood structures.	App. C, I, A, 1. Level 1
	15.02 Identify wood defects.	App. C, I, A, 2. Level 1
	15.03 Inspect wood structures.	App. C, I, A, 3. Level 1
16.0	Perform aircraft covering--The student will be able to:	
	16.01 Select and apply fabric and fiberglass covering materials.	App. C, I, B, 4. Level 1
	16.02 Inspect, test, and repair fabric and fiberglass.	App. C, I, B, 5. Level 1
17.0	Apply aircraft finishes--The student will be able to:	
	17.01 Apply trim, letters, and touch-up paint.	App. C, I, C, 6. Level 1
	17.02 Identify and select aircraft finishing materials.	App. C, I, C, 7. Level 2
	17.03 Apply finishing materials.	App. C, I, C, 8. Level 2
	17.04 Inspect finishes and identify defects.	App. C, I, C, 9. Level 2
	17.05 Demonstrate an understanding of common safety practices dealing with paints and solvents.	
18.0	Repair sheet-metal and non-metallic structures--The student will be able to:	
	18.01 Select, install, and remove special fasteners for metallic, bonded, and composite structures.	App. C, I, D, 10. Level 2
	18.02 Inspect bonded structures.	App. C, I, D, 11. Level 2
	18.03 Inspect, test, and repair fiberglass, plastics, honeycomb, composite, and laminated primary and secondary structures.	App. C, I, D, 12. Level 2

CTE Standards and Benchmarks		FAA FAR Part 147
	18.04 Inspect, check, service, and repair windows, doors, and interior furnishings.	App. C, I, D, 13. Level 2
	18.05 Inspect and repair sheet-metal structures.	App. C, I, D, 14. Level 3
	18.06 Install conventional rivets.	App. C, I, D, 15. Level 3
	18.07 Form, lay out, and bend sheet metal.	App. C, I, D, 16. Level 3
19.0	Perform and identify proper welding--The student will be able to:	
	19.01 Weld magnesium and titanium.	App. C, I, E, 17. Level 1
	19.02 Solder stainless steel.	App. C, I, E, 18. Level 1
	19.03 Fabricate tubular structures.	App. C, I, E, 19. Level 1
	19.04 Solder, braze, gas-weld, and arc-weld steel.	App. C, I, E, 20. Level 2
	19.05 Weld aluminum and stainless steel.	App. C, I, E, 21. Level 1
20.0	Perform assembly and rigging--The student will be able to:	
	20.01 Rig rotary-wing aircraft.	App. C, I, F, 22. Level 1
	20.02 Rig fixed-wing aircraft.	App. C, I, F, 23. Level 2
	20.03 Check alignment of structures.	App. C, I, F, 24. Level 2
	20.04 Assemble aircraft components, including flight control surfaces.	App. C, I, F, 25. Level 3
	20.05 Balance, rig, and inspect movable primary and secondary flight control structures.	App. C, I, F, 26. Level 3
	20.06 Jack aircraft.	App. C, I, F, 27. Level 3
21.0	Perform airframe inspection--The student will be able to:	
	21.01 Perform aircraft conformity and airworthiness inspections.	App. C, I, G, 28. Level 3
22.0	Maintain aircraft landing gear systems--The student will be able to:	
	22.01 Inspect, check, service, and repair landing gear, retraction systems, shock struts, brakes, wheels, tires, and steering systems.	App. C, II, A, 29. Level 3
	22.02 Utilize proper safety procedures and equipment when working on aircraft with electrical or hydraulic power on.	
	22.03 Utilize proper safety procedures when working on landing gear struts or wheel and tire assemblies.	
23.0	Maintain hydraulic and pneumatic power systems--The student will be able to:	
	23.01 Repair hydraulic and pneumatic power system components.	App. C, II, B, 30. Level 2
	23.02 Identify and select hydraulic fluids.	App. C, II, B, 31. Level 3
	23.03 Inspect, check, service, troubleshoot, and repair hydraulic and pneumatic power systems.	App. C, II, B, 32. Level 3

CTE Standards and Benchmarks		FAA FAR Part 147
24.0	Maintain cabin atmosphere control systems--The student will be able to:	
24.01	Inspect, check, troubleshoot, service, and repair heating, cooling, air-conditioning, pressurization systems, and air-cycle machines.	App. C, II, C, 33. Level 1
24.02	Inspect, check, troubleshoot, service, and repair heating, cooling, air-conditioning, and pressurization systems.	App. C, II, C, 34. Level 1
24.03	Inspect, check, troubleshoot, service and repair oxygen systems.	App. C, II, C, 35. Level 2
25.0	Maintain aircraft instrument systems--The student will be able to:	
25.01	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.	App. C, II, D, 36. Level 1
25.02	Install instruments and perform a static pressure-system leak test.	App. C, II, D, 37. Level 2
26.0	Maintain communication and navigation systems--The student will be able to:	
26.01	Inspect, check, and troubleshoot autopilot, servos, and approach coupling systems.	App. C, II, E, 38. Level 1
26.02	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.	App. C, II, E, 39. Level 1
26.03	Inspect and repair antenna and electronic equipment installations.	App. C, II, E, 40. Level 2

Course Number: AMT0711
Occupational Completion Point: B (2 of 2)
Aviation Maintenance Technician with FAA Airframe Rating 2 – 480 Hours – SOC Code 49-3011

Course Description:
The Aviation Maintenance Technician with FAA Airframe Rating (2) course is designed to build on the skills and knowledge students learned in the Aviation Maintenance Technician with FAA Airframe Rating (1) course. Students explore career opportunities and requirements of a professional aviation mechanic. Students study aircraft fuel, electrical, position, warning, ice and rain control, fire-protection, FAA Airframe licensing requirements, employability skills, and entrepreneurship.

CTE Standards and Benchmarks		FAA FAR Part 147
27.0	Inspect and repair aircraft fuel systems--The student will be able to:	
27.01	Check and service fuel-dump systems	App. C, II, F, 41. Level 1
27.02	Perform fuel-management transfer, re-fueling, and de-fueling	App. C, II, F, 42. Level 1
27.03	Inspect, check, and repair pressure fuel systems	App. C, II, F, 43. Level 1

CTE Standards and Benchmarks		FAA FAR Part 147
	27.04 Repair aircraft fuel-system components.	App. C, II, F, 44. Level 2
	27.05 Inspect and repair fluid quantity-indicating systems.	App. C, II, F, 45. Level 2
	27.06 Troubleshoot, service, and repair fluid pressure and temperature warning systems.	App. C, II, F, 46. Level 2
	27.07 Inspect, check, service, troubleshoot, and repair aircraft fuel systems.	App. C, II, F, 47. Level 3
28.0	Inspect and repair aircraft electrical systems--The student will be able to:	
	28.01 Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturers' specifications; and repair pins and sockets of aircraft connectors.	App. C, II, G, 48. Level 2
	28.02 Install, check, and service airframe electric wiring, controls, switches, indicators, and protective devices.	App. C, II, G, 49. Level 3
	28.03 Inspect, check, troubleshoot, service, and repair alternating and direct current electrical systems.	App. C, II, G, 50a. Level 3
	28.04 Inspect, check, and troubleshoot constant and integrated speed- drive generators.	App. C, II, G, 50b. Level 1
29.0	Inspect and repair position and warning systems--The student will be able to:	
	29.01 Inspect, check, and service speed and configuration warning systems, electrical brake controls, and antiskid systems.	App. C, II, H, 51. Level 2
	29.02 Inspect, check, troubleshoot, and service landing gear position- indicating and warning systems.	App. C, II, H, 52. Level 3
30.0	Maintain ice and rain control systems--The student will be able to:	
	30.01 Inspect, check, troubleshoot, service, and repair airframe ice and rain control systems.	App. C, II, I, 53. Level 2
31.0	Inspect and repair aircraft fire-protection systems--The student will be able to:	
	31.01 Inspect, check, and service smoke and carbon monoxide detection systems.	App. C, II, J, 54. Level 1
	31.02 Inspect, check, service, troubleshoot, and repair aircraft fire detection and extinguishing systems.	App. C, II, J, 55. Level 3
32.0	Demonstrate knowledge of Federal Aviation Administration Airframe licensing requirements--The student will be able to:	
	32.01 Explain the requirements for obtaining FAA authorization to take the FAA Airframe examinations.	
33.0	Demonstrate employability skills as an Aviation Maintenance Technician (AMT) with an FAA Airframe rating--The student will be able to:	
	33.01 Conduct a job search for an AMT with FAA Airframe rating position.	
	33.02 Secure information about the requirements for an AMT with FAA Airframe rating in a particular firm.	
	33.03 Identify documents that may be required when applying for an AMT with FAA Airframe rating position.	
	33.04 Complete a job-application form correctly.	
	33.05 Demonstrate competency in job-interview techniques.	

CTE Standards and Benchmarks		FAA FAR Part 147
	33.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other employees.	
	33.07 Identify or adopt acceptable 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 opportunities in Aviation Airframe Maintenance occupations--The student will be able to:	
	34.01 Define entrepreneurship.	
	34.02 Describe the importance of entrepreneurship to Aviation Airframe Maintenance occupations.	
	34.03 List the advantages and disadvantages of Aviation Airframe Maintenance business ownership.	
	34.04 Identify the risks involved in ownership of an Aviation Airframe Maintenance business.	
	34.05 Identify the necessary personal characteristics of a successful Aviation Airframe Maintenance business owner.	
	34.06 Identify the business skills needed to operate an Aviation Airframe Maintenance business efficiently and effectively.	

Additional Information

Laboratory Activities

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

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

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, torqueing 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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	I470616
CIP Number	0647060601
Grade Level	30, 31
Standard Length	1500 hours
Teacher Certification	MOTORCYCLE @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3052 – Motorcycle Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 10

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.

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

Program Structure

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

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 hours	49-3052
B	MOM0002	Parts Clerk	200 hours	49-3052
C	MOM0100	Helper, Mechanic	400 hours	49-3052
D	MOM0400	Motorcycle Mechanic	750 hours	49-3052

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Recognize personal and industry safety requirements.
02.0 Verify the proper use and care of basic shop tools and equipment.
03.0 Outline the appropriate set-up procedures.
04.0 Show proficiency in performing routine preventative maintenance services.
05.0 Compare and contrast the differences in the measurement systems, fasteners and thread repair.
06.0 Illustrate industry-related math skills.
07.0 Show proficiency in parts inventory identification and repair order processing.
08.0 Perform basic services and minor repairs.
09.0 Perform basic frame and suspension service.
10.0 Perform basic electrical system service.
11.0 Diagnose, service and repair cooling systems.
12.0 Diagnose, repair and recondition basic engine components.
13.0 Apply industry-related science to motorcycle service.
14.0 Diagnose, service and repair frames and suspension components.
15.0 Diagnose, service and repair wheels, tires, and brakes.
16.0 Diagnose, service and repair drive trains.
17.0 Diagnose, service and repair fuel and exhaust systems.
18.0 Troubleshoot and repair electrical-system components.
19.0 Tune up motorcycles.
20.0 Diagnose, repair, and recondition engines.
21.0 Demonstrate the proper use of industry tools and equipment.

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

Course Description:
The Assembler (Setup) course prepares students for entry into the motorcycle service industry. Students explore career opportunities and requirements of a professional motorcycle mechanic. Students study safety requirements, tools and equipment, set-up procedures, and routine preventative maintenance.

CTE Standards and Benchmarks	
01.0	Recognize personal and industry safety requirements--The student will be able to:
01.01	List the federal and state standards for health and safety, including OSHA and the "Right-to-Know" law.
01.02	Outline the safety requirements for shop organization and management.
01.03	Recognize the safety requirements for the use of industry tools and equipment.
01.04	List the fire-safety precautions.
01.05	Recognize electrical-safety precautions.
02.0	Verify the proper use and care of basic shop tools and equipment--The student will be able to:
02.01	Categorize general and specialized hand tools.
02.02	Examine and use power tools.
02.03	Classify and use fasteners.
02.04	Document proper use of air tools.
02.05	Utilize oxy-acetylene welding outfit for heating, welding, brazing and cutting.
02.06	Use heating devices to perform service procedures.
03.0	Outline the appropriate set-up procedures--The student will be able to:
03.01	Inspect and interpret vehicle identification number information.
03.02	Inspect tires; check and adjust air pressure.
03.03	Check for proper fluid levels.

CTE Standards and Benchmarks	
03.04	Utilize electrical test equipment to isolate defective components and 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	Read and interpret a wiring diagram.
03.10	Troubleshoot and repair wiring harnesses.
04.0	Show proficiency in performing routine preventative maintenance services--The student will be able to:
04.01	Compare and contrast typical motorcycle lubricants and lubricant properties.
04.02	Inspect and test head and tail lamp circuits; aim headlights and replace bulbs.
04.03	Inspect battery terminals and the 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 the tightness of the oil filters.

Florida Department of Education
Student Performance Standards

Course Number: MOM0002
Occupational Completion Point: B
Parts Clerk – 200 Hours – SOC Code 49-3052

Course Description:
The Parts Clerk course is designed to build on the skills and knowledge students learned in Assembler (Setup) course for entry into the motorcycle service industry. Students explore career opportunities and requirements of a professional motorcycle mechanic. Students study measurement systems, fasteners, thread repair, math, parts inventory, and repair ordering.

CTE Standards and Benchmarks	
05.0	Compare and contrast the differences in the measurement systems, fasteners and thread repair--The student will be able to:
05.01	Describe and distinguish the different types of measurement systems.
05.02	Compare and contrast the different types of fasteners.
05.03	Explain the steps of inspecting, cleaning and replacement of broken fasteners.
05.04	Describe the sequence of tightening and torqueing fasteners to specs.
05.05	Compare and contrast the different stress fractures of fasteners
06.0	Illustrate 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.
06.03	Perform correct measurements using different precise metering tools. T handle measuring tool.
06.04	Perform correct measures using Vernier Calipers.
06.05	Perform correct measures using Micrometers.
07.0	Show 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 with the latest computer updates.

CTE Standards and Benchmarks
07.06 Interpret and verify complaint; determine needed repairs. If find more than first estimated ask customer if ok to do repairs.

Florida Department of Education
Student Performance Standards

Course Number: MOM0100
Occupational Completion Point: C
Helper, Mechanic – 400 Hours – SOC Code 49-3052

Course Description:
The Helper, Mechanic course is designed to build on the skills and knowledge students learned in Parts Clerk course for entry into the motorcycle service industry. Students explore career opportunities and requirements of a professional motorcycle mechanic. Students study basic services and minor repairs, basic frame, suspension, electrical, cooling, and engine components.

CTE Standards and Benchmarks	
08.0	Perform basic services and minor repairs--The student will be able to:
08.01	Identify, select and use appropriate replacement parts.
08.02	Clean or replace after inspection of air filtration.
08.03	Service and check batteries, if not charging then replace.
08.04	Service lubrication systems.
08.05	Name the components of air and liquid cooling systems by name and function.
08.06	Remove, remount and balance tires.
08.07	Diagnose, service and repair chain and belt final drive components.
09.0	Perform basic frame and suspension service--The student will be able to:
09.01	Categorize the different front- and rear-suspension systems and explain their operation.
09.02	Compare the parts and functions of different frames and suspension systems.
09.03	Explain how wheels, tires and suspension affect chassis performance and driveability.
09.04	Replace and true a wheel assembly.
09.05	Diagnose and service wheel bearings and seals.
10.0	Perform basic electrical system service--The student will be able to:
10.01	Assess and use basic electrical system test equipment.
10.02	Use basic DC electrical theory to select appropriate test procedures.
10.03	Inspect and test fusible links, circuit breakers and fuses; replace as needed.

CTE Standards and Benchmarks	
	10.04 Check electrical circuits with a test light; determine needed repairs.
	10.05 Troubleshoot and repair battery-operated electronic ignition systems.
	10.06 Troubleshoot and repair magneto-ignition systems.
	10.07 Troubleshoot and repair capacitive-discharge-ignition (CDI) systems.
	10.08 Troubleshoot and repair half-wave and full-wave charging systems.
	10.09 Troubleshoot and repair three-phase charging systems.
	10.10 Troubleshoot and repair electrical starter systems.
	10.11 Troubleshoot and repair Direct-Current (DC) Generators.
	10.12 Troubleshoot and repair Warning systems.
11.0	Diagnose, service, and repair cooling systems--The student will be able to:
	11.01 Categorize the components of air and liquid cooling systems by name and function.
	11.02 Diagnose service and repair air-cooling systems.
	11.03 Diagnose service and repair liquid cooling systems.
12.0	Diagnose, repair and recondition basic engine components--The student will be able to:
	12.01 Explain the engine operating theory.
	12.02 Recondition a two-stroke engine top-end.
	12.03 Recondition a single-cylinder four-stroke engine top-end.
	12.04 Recondition a multi-cylinder four-stroke engine top-end.
	12.05 Rebuild a four-stroke head.
	12.06 Recondition a single-cylinder four-stroke engine bottom-end.
	12.07 Recondition a multi-cylinder four-stroke engine bottom-end.
	12.08 Recondition a two-stroke engine bottom-end.
	12.09 Service a plain-bearing crankshaft.
	12.10 Diagnose and repair oil-delivery systems.

Florida Department of Education
Student Performance Standards

Course Number: MOM0400
Occupational Completion Point: D
Motorcycle Mechanic – 750 Hours – SOC Code 49-3052

Course Description:
The Motorcycle Mechanic course is designed to build on the skills and knowledge students learned in Helper, Mechanic course for entry into the motorcycle service industry. Students explore career opportunities and requirements of a professional motorcycle mechanic. Students study science of motorcycles, frames, suspension systems, wheels, tires, brakes, drive trains, fuel, exhaust systems, troubleshooting and repair of electrical system components, study tune-up, engine reconditioning, and proper use of industry tools/equipment.

CTE Standards and Benchmarks	
13.0	Apply industry-related science to motorcycle service--The student will be able to:
13.01	Explain how temperature extremes, chemical reactions and moisture content affect motorcycle systems.
13.02	Draw conclusions or make inferences from data.
14.0	Diagnose, service, and repair frames and suspension components--The student will be able to:
14.01	Service and repair front suspension.
14.02	Service and repair rear suspension.
14.03	Inspect, remove, and replace frames.
15.0	Diagnose, service, and repair wheels, tires and brakes--The student will be able to:
15.01	Diagnose and repair mechanical disc and drum brake systems and components.
15.02	Diagnose and repair hydraulic disc and drum brake systems and components.
15.03	Diagnose and repair ABS braking systems and other advanced stopping systems.
16.0	Diagnose, service, and repair drive trains--The student will be able to:
16.01	Diagnose, service, and repair primary-drive systems.
16.02	Diagnose, service, and repair clutch assemblies.
16.03	Diagnose, service, and repair transmissions.
16.04	Diagnose, service, and repair shaft drives.
16.05	Diagnose and repair kickstart systems.

CTE Standards and Benchmarks	
17.0	Diagnose, service, and repair fuel and exhaust systems--The student will be able to:
17.01	Identify components and operation of carburetion and fuel-injection systems.
17.02	Diagnose, service, and repair slide-type carburetors.
17.03	Diagnose, service, and repair constant-velocity-type (CV-type) carburetors.
17.04	Diagnose, service, and repair fixed-venturi carburetors.
17.05	Diagnose, service, and repair fuel-injection systems.
17.06	Diagnose service and repair exhaust systems replace necessary components as needed.
17.07	Diagnose, service, and repair other fuel-delivery-system components.
18.0	Troubleshoot and repair electrical-system components--The student will be able to:
18.01	Utilize electrical test equipment to isolate defective components.
18.02	Read and interpret a wiring diagram.
18.03	Troubleshoot and repair wiring harnesses.
18.04	Troubleshoot and repair battery/points ignition systems.
18.05	Troubleshoot and repair battery-operated electronic ignition systems.
18.06	Troubleshoot and repair magneto-ignition systems.
18.07	Troubleshoot and repair capacitive-discharge-ignition (CDI) systems.
18.08	Troubleshoot and repair half-wave and full-wave charging systems.
18.09	Troubleshoot and repair three-phase charging systems.
18.10	Troubleshoot and repair electrical starter systems.
18.11	Troubleshoot and repair direct current (DC) generators.
18.12	Troubleshoot and repair warning systems.
19.0	Tune up motorcycles--The student will be able to:
19.01	Diagnose driveability problems.
19.02	Adjust the cam chain tension.
19.03	Adjust the valve clearances.
19.04	Replace the ignition points, condenser, and spark plugs.
19.05	Check and set the ignition timing.

CTE Standards and Benchmarks	
	19.06 Adjust the carburetor and service the fuel-delivery systems.
	19.07 Service the air-filtration systems.
	19.08 Service and diagnose batteries.
	19.09 Service the lubrication systems.
20.0	Diagnose, repair, and recondition engines--The student will be able to:
	20.01 Explain the engine operating theory.
	20.02 Recondition a single-cylinder four-stroke engine top-end.
	20.03 Recondition a multi-cylinder four-stroke engine top-end.
	20.04 Recondition a two-stroke engine top-end.
	20.05 Rebuild a four-stroke head.
	20.06 Recondition a single-cylinder four-stroke engine bottom-end.
	20.07 Recondition a multi-cylinder four-stroke engine bottom-end.
	20.08 Recondition a two-stroke engine bottom-end.
	20.09 Rebuild a built-up crankshaft.
	20.10 Service a plain-bearing crankshaft.
	20.11 Diagnose and repair electric-starter drive systems.
	20.12 Diagnose and repair oil-delivery systems.
21.0	Demonstrate the proper use of industry tools and equipment--The student will be able to:
	21.01 Utilize oxyacetylene welding outfit for heating, welding, brazing and cutting.
	21.02 Use heating devices to perform service procedures.
	21.03 Recondition cylinders.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

SkillsUSA is the intercurricular 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Aircraft Powerplant Mechanics**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	I470622
CIP Number	0647060800
Grade Level	30, 31
Standard Length	1,440 hours
Teacher Certification	AIR MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3011 – Aircraft Mechanics and Service Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 10

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.

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

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points. The Aviation General Maintenance Technical Helper (AMT0700) course is the core course.

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 hours	49-3011
B	AMT0720 AMT0721	Aviation Maintenance Technician with FAA Powerplant Rating 1 Aviation Maintenance Technician with FAA Powerplant Rating 2	480 hours 480 hours	49-3011 49-3011

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Aircraft Powerplant Mechanics program can be found using the following link:

http://www.gpo.gov/fdsys/pkg/CFR-2012-title14-vol3/pdf/CFR-2012-title14-vol3-part147-appC.pdf

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 principles of basic physics and aerodynamics.
11.0 Demonstrate the use of maintenance publications.
12.0 Interpret mechanic privileges and limitations.
13.0 Demonstrate appropriate communication skills.
14.0 Demonstrate employability skills as an Aviation General Maintenance Technician Helper.
15.0 Perform basic reciprocating engine skills.
16.0 Perform basic turbine engine skills.
17.0 Perform engine inspection.
18.0 Maintain engine instrument systems.
19.0 Maintain engine fire-protection systems.
20.0 Maintain engine electrical systems.
21.0 Maintain lubrication systems.
22.0 Maintain ignition and starting systems.
23.0 Maintain fuel-metering systems.
24.0 Maintain engine fuel systems.
25.0 Maintain induction and engine airflow systems.
26.0 Maintain engine cooling systems.
27.0 Maintain engine exhaust and reverser systems.
28.0 Maintain aircraft propellers.
29.0 Maintain unducted fans.
30.0 Maintain auxiliary power units
31.0 Demonstrate knowledge of FAA Powerplant licensing requirements.
32.0 Demonstrate employability skills for an Aviation Maintenance Technician with a FAA Powerplant rating.
33.0 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

Course Description:
The Aviation General Maintenance Technician Helper course prepares students for entry into the aviation industry. Students explore career opportunities and requirements of a professional aviation mechanic. Students study basic electricity, aircraft drawing, weight, balance, fluid lines, fittings, materials, processes, operations, services, cleaning, corrosion-control, math, forms, records, basic physics, maintenance publications, communication, and employability skills.

CTE Standards and Benchmarks		FAA FAR Part 147
01.0	Perform basic electricity skills--The student will be able to:	
01.01	Calculate and measure capacitance and inductance.	App. B, A, 1. Level 2
01.02	Calculate and measure electrical power.	App. B, A, 2. Level 2
01.03	Measure voltage, current, resistance, and continuity.	App. B, A, 3. Level 3
01.04	Determine the relationship of voltage, current, and resistance in electrical circuits.	App. B, A, 4. Level 3
01.05	Read and interpret aircraft electrical-circuit diagrams, including solid-state devices and logic functions.	App. B, A, 5. Level 3
01.06	Inspect and service batteries.	App. B, A, 6. 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.	App. B, B, 7. Level 2
02.02	Draw sketches of repairs and alterations.	App. B, B, 8. Level 3
02.03	Use blueprint information.	App. B, B, 9. Level 3
02.04	Use graphs and charts.	App. B, B, 10. Level 3
03.0	Demonstrate aircraft weight and balance skills--The student will be able to:	
03.01	Weigh aircraft.	App. B, C, 11. Level 2

CTE Standards and Benchmarks		FAA FAR Part 147
	03.02 Perform complete weight-and-balance check and record data.	App. B, C, 12. Level 3
	03.03 Properly configure aircraft for weighing and capable of setting up and using weighing equipment.	
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.	App. B, D, 13. Level 3
	04.02 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.	App. B, E, 14. Level 1
	05.02 Perform dye penetrant, eddy current, ultrasonic, and magnetic particle inspections.	App. B, E, 15. Level 2
	05.03 Perform basic heat-testing processes.	App. B, E, 16. Level 1
	05.04 Identify and select aircraft hardware and materials.	App. B, E, 17. Level 3
	05.05 Inspect and check welds.	App. B, E, 18. Level 3
	05.06 Perform precision measurements.	App. B, E, 19. 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.	App. B, G, 20. Level 2
	06.02 Identify and select fuels.	App. B, G, 21. 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.	App. B, G, 22. Level 3
	07.02 Inspect, identify, remove, and treat aircraft corrosion and perform aircraft cleaning. Understand metal strength limitations when removing corrosion.	App. B, G, 23. Level 3
08.0	Demonstrate mathematical skills--The student will be able to:	
	08.01 Extract roots and raise numbers to a given power.	App. B, H, 24. 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.	App. B, H, 25. Level 3
	08.03 Solve ratio, proportion, and percentage problems.	App. B, H, 26. Level 3
	08.04 Perform algebraic operations involving addition, subtraction, multiplication, and division of positive and negative numbers.	App. B, H, 27. Level 3
09.0	Maintain forms and records--The student will be able to:	

CTE Standards and Benchmarks		FAA FAR Part 147
	09.01 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records.	App. B, I, 28. Level 3
	09.02 Complete required maintenance forms, records, and inspection reports.	App. B, I, 29. Level 3
10.0	Apply principles of basic physics--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.	App. B, J, 30. Level 2
	10.02 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.	
	10.03 Draw conclusions or make inferences from data.	
	10.04 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.	
	10.05 Understand pressure measurement in terms of PSI, inches of mercury, and KPA.	
11.0	Demonstrate the use of maintenance publications--The student will be able to:	
	11.01 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.	App. B, K, 31. Level 3
	11.02 Read technical data.	App. B, K, 32. Level 3
12.0	Interpret mechanic privileges and limitations--The student will be able to:	
	12.01 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter.	App. B, L, 33. Level 3
	12.02 Identify the information in Federal Aviation Regulations (FAR) Part 65 pertaining to eligibility for Aviation Maintenance Technician (AMT) certification and ratings.	
	12.03 Identify the FAA requirements that must be satisfied in order to display the FAA Airframe and Powerplant license.	
13.0	Demonstrate appropriate communication skills--The student will be able to:	
	13.01 Write logical and understandable statements or phrases to accurately complete forms/invoices commonly used in business and industry.	
	13.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.	
	13.03 Read and follow written and oral instructions.	
	13.04 Answer and ask questions coherently and concisely.	
	13.05 Read critically by recognizing assumptions and implications and by evaluating ideas.	
	13.06 Demonstrate appropriate telephone/communication skills.	
14.0	Demonstrate employability skills as an Aviation General Maintenance Technician Helper--The student will be able to:	

CTE Standards and Benchmarks	FAA FAR Part 147
14.01 Conduct a job search.	
14.02 Secure information about a job.	
14.03 Identify documents that may be required when applying for a job position.	
14.04 Complete a job-application form correctly.	
14.05 Demonstrate job-interview skills.	
14.06 Identify appropriate responses to criticism from employer, supervisor, or other employees.	
14.07 Identify work habits for getting and keeping a job.	
14.08 Explain how to make job changes.	
14.09 Explain the purpose of the Right-to-Know" law.	

Florida Department of Education
Student Performance Standards

Course Number: AMT0720
Occupational Completion Point: B (1 of 2)
Aviation Maintenance Technician with FAA Powerplant Rating 1 – 480 Hours – SOC Code 49-3011

Course Description:
The Aviation Maintenance Technician with FAA Powerplant Rating (1) course is designed to build on the skills and knowledge students learned in the Aviation General Maintenance Technician Helper course. Students explore career opportunities and requirements of a professional aviation mechanic. Students study reciprocating engines, turbine engines, inspection, instruments, fire-protection, electrical, lubrication, ignition, and starting systems.

CTE Standards and Benchmarks		FAA FAR Part 147
15.0	Perform basic reciprocating engine skills--The student will be able to:	
	15.01 Inspect and repair a radial engine.	App. D, I, A, 1. Level 1
	15.02 Overhaul a reciprocating engine.	App. D, I, A, 2. Level 2
	15.03 Inspect, check, service, and repair reciprocating engines and engine installations.	App. D, I, A, 3. Level 3
	15.04 Install, troubleshoot, and remove reciprocating engines.	App. D, I, A, 4. Level 3
16.0	Perform basic turbine engine skills--The student will be able to:	
	16.01 Overhaul a turbine engine.	App. D, I, B, 5. Level 2
	16.02 Inspect, check, service, and repair turbine engines and turbine engine installations.	App. D, I, B, 6. Level 3
	16.03 Install, troubleshoot, and remove turbine engines.	App. D, I, B, 7. Level 3
17.0	Perform engine inspection--The student will be able to:	
	17.01 Perform Powerplant conformity and airworthiness inspections.	App. D, I, C, 8. Level 3
18.0	Maintain engine instrument systems--The student will be able to:	
	18.01 Troubleshoot, service, and repair electrical and mechanical fluid rate-of-flow indicating systems.	App. D, II, A, 9. Level 2
	18.02 Inspect, check, service, troubleshoot, and repair electrical and mechanical engine temperature, pressure, and r.p.m. indicating systems.	App. D, II, A, 10. Level 2
19.0	Maintain engine fire-protection systems--The student will be able to:	
	19.01 Inspect, check, service, troubleshoot, and repair engine fire-detection and extinguishing systems.	App. D, II, B, 11. Level 3
20.0	Maintain engine electrical systems--The student will be able to:	

CTE Standards and Benchmarks		FAA FAR Part 147
	20.01 Repair engine electrical system components.	App. D, II, C, 12. Level 2
	20.02 Install, check, and service engine electrical wiring, controls, switches, indicators, and protective devices.	App. D, II, C, 13. Level 3
21.0	Maintain lubrication systems--The student will be able to:	
	21.01 Identify and select lubricants.	App. D, II, D, 14. Level 2
	21.02 Repair engine lubrication system components.	App. D, II, D, 15. Level 2
	21.03 Inspect, check, service, troubleshoot, and repair engine lubrication systems.	App. D, II, D, 16. Level 3
22.0	Maintain ignition and starting systems--The student will be able to:	
	22.01 Overhaul magneto and ignition harness.	App. D, II, E, 17. Level 2
	22.02 Inspect, service, troubleshoot, and repair reciprocating and turbine engine ignition systems and components.	App. D, II, E, 18. Level 2
	22.03 Inspect, service, troubleshoot, and repair turbine engine electrical starting systems.	App. D, II, E, 19a. Level 3
	22.04 Inspect, service, and troubleshoot turbine engine pneumatic starting systems.	App. D, II, E, 19b. Level 1

Course Number: AMT0721
Occupational Completion Point: B (2 of 2)
Aviation Maintenance Technician with FAA Powerplant Rating 2 – 480 Hours – SOC Code 49-3011

Course Description:
The Aviation Maintenance Technician with FAA Powerplant Rating (2) course is designed to build on the skills and knowledge students learned in the Aviation Maintenance Technician with FAA Powerplant Rating (1) course. Students explore career opportunities and requirements of a professional aviation mechanic. Students study fuel, metering, induction, airflow, cooling, exhaust, reverser, propellers, inductors, auxiliary power units, FAA Powerplant Rating licensing, employability skills, and entrepreneurship.

CTE Standards and Benchmarks		FAA FAR Part 147
23.0	Maintain fuel metering systems--The student will be able to:	
	23.01 Troubleshoot and adjust turbine engine fuel-metering systems and electronic-engine fuel controls.	App. D, II, F, 20. Level 1
	23.02 Overhaul carburetor.	App. D, II, F, 21. Level 1
	23.03 Repair engine fuel metering system components.	App. D, II, F, 22. Level 2
	23.04 Inspect, check, service, troubleshoot, and repair reciprocating and turbine engine fuel-metering systems.	App. D, II, F, 23. Level 3
24.0	Maintain engine fuel systems--The student will be able to:	

CTE Standards and Benchmarks		FAA FAR Part 147
	24.01 Repair engine fuel system components.	App. D, II, G, 24. Level 2
	24.02 Inspect, check, service, troubleshoot, and repair engine fuel systems.	App. D, II, G, 25. Level 3
25.0	Maintain induction and engine airflow systems --The student will be able to:	
	25.01 Inspect, check, troubleshoot, service, and repair engine ice and rain control systems.	App. D, II, H, 26. Level 2
	25.02 Inspect, check, service, troubleshoot, and repair heat exchangers, superchargers, and turbine engine airflow and temperature control systems.	App. D, II, H, 27. Level 1
	25.03 Inspect, check, service, and repair carburetor air intake and induction manifolds.	App. D, II, H, 28. Level 3
26.0	Maintain engine cooling systems--The student will be able to:	
	26.01 Repair engine cooling system components.	App. D, II, I, 29. Level 2
	26.02 Inspect, check, troubleshoot, service, and repair engine cooling systems.	App. D, II, I, 30. Level 3
27.0	Maintain engine exhaust and reverser systems--The student will be able to:	
	27.01 Repair engine exhaust system components.	App. D, II, J, 31. Level 2
	27.02 Inspect, check, troubleshoot, service, and repair engine exhaust systems.	App. D, II, J, 32a. Level 3
	27.03 Troubleshoot and repair engine thrust reverser systems and related components.	App. D, II, J, 32b. Level 1
28.0	Maintain aircraft propellers--The student will be able to:	
	28.01 Inspect, check, service, and repair propeller synchronizing and ice control systems.	App. D, II, K, 33. Level 1
	28.02 Identify and select propeller lubricants.	App. D, II, K, 34. Level 2
	28.03 Balance propellers.	App. D, II, K, 35. Level 1
	28.04 Repair propeller control system components.	App. D, II, K, 36. Level 2
	28.05 Inspect, check, service, and repair fixed-pitch, constant-speed, feathering propellers, and propeller-governing systems.	App. D, II, K, 37. Level 3
	28.06 Install, troubleshoot, and remove propellers.	App. D, II, K, 38. Level 3
	28.07 Repair aluminum alloy propeller blades.	App. D, II, K, 39. Level 3
29.0	Maintain unducted fans-The student will be able to:	
	29.01 Inspect and troubleshoot unducted fan systems and components.	App. D, II, L, 40. Level 1
30.0	Maintain auxiliary power units-The student will be able to:	
	30.01 Inspect, check, service, and troubleshoot turbine-driven auxiliary power units.	
31.0	Demonstrate knowledge of Federal Aviation Administration Powerplant licensing requirements--The student will be able to:	
	31.01 Explain the requirements for obtaining FAA authorization to take the FAA Powerplant examinations.	
32.0	Demonstrate employability skills for an Aviation Maintenance Technician (AMT) with an FAA Powerplant rating--The student will be able to:	

CTE Standards and Benchmarks		FAA FAR Part 147
	32.01 Conduct a job search for an AMT position.	
	32.02 Secure information about the requirements for an AMT in a particular firm.	
	32.03 Identify documents that may be required when applying for an AMT position.	
	32.04 Complete a job-application form correctly.	
	32.05 Demonstrate competency in job-interview techniques.	
	32.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other employees.	
	32.07 Identify or adopt acceptable AMT work habits.	
	32.08 Demonstrate knowledge of how to make job changes appropriately.	
	32.09 Demonstrate acceptable employee health habits.	
	32.10 Demonstrate knowledge of the "Right-to-Know" law.	
33.0	Demonstrate an understanding of entrepreneurship related to opportunities in Aviation Powerplant Maintenance occupations--The student will be able to:	
	33.01 Define entrepreneurship.	
	33.02 Describe the importance of entrepreneurship to the Aviation Maintenance industry.	
	33.03 List the advantages and disadvantages of Aviation Maintenance business ownership.	
	33.04 Identify the risks involved in ownership of an Aviation Maintenance business.	
	33.05 Identify the necessary personal characteristics of a successful Aviation Maintenance business owner.	
	33.06 Identify the business skills needed to operate an Aviation Maintenance business efficiently and effectively.	

Additional Information

Laboratory Activities

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

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

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, torqueing 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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Automotive Detailing and Reconditioning**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	I470623
CIP Number	0647060302
Grade Level	30, 31
Standard Length	450 hours
Teacher Certification	AUTO BODY @7 7G AUTO IND @7 %7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-7061 – Cleaners of Vehicles and Equipment
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to communication skills, leadership skills, human relations and employability skills, safe and efficient work practices.

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

Program Structure

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

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 hours	53-7061
B	ARR0611	Reconditioning Detailer	150 hours	53-7061
C	ARR0612	Automobile Detailer	150 hours	53-7061

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate shop and occupational safety skills.
02.0 Demonstrate proficiency in washing a vehicle.
03.0 Perform vehicle interior cleaning.
04.0 Demonstrate proficiency in reconditioning vehicle paint surfaces.
05.0 Demonstrate proficiency in caring for vinyl tops.
06.0 Degrease and clean engine compartment.
07.0 Perform minor upholstery and vinyl repairs.
08.0 Demonstrate proficiency in applying vinyl pinstripes.
09.0 Demonstrate proficiency in applying window tint.

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

Course Description:
The Basic Prep, Automotive course prepares students for entry into the automotive detailing and reconditioning industry. Students explore career opportunities and requirements of a professional auto detailer. Students study occupational safety, washing, and interior cleaning.

CTE Standards and Benchmarks	
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.

Florida Department of Education
Student Performance Standards

Course Number: ARR0611
Occupational Completion Point: B
Reconditioning Detailer – 150 Hours – SOC Code 53-7061

Course Description:
The Reconditioning Detailer course is designed to build on the skills and knowledge students learned in Basic Prep, Automotive course for entry into the automotive detailing and reconditioning industry. Students explore career opportunities and requirements of a professional auto detailer. Students study vehicle paint surfaces, vinyl tops, engine compartments, and upholstery and vinyl repairs.

CTE Standards and Benchmarks	
04.0	Demonstrate proficiency in reconditioning vehicle paint surfaces--The student will be able to:
04.01	Identify the proper supplies and chemicals needed to recondition vehicle paint surfaces.
04.02	Operate a power buffer.
04.03	Apply rubbing/buffing compound.
04.04	Remove heavy paint oxidation.
04.05	Apply polishing compounds.
04.06	Apply waxes, sealants, and polymers.
04.07	Apply touch-up paint.
04.08	Contamination Removal/Claying
05.0	Demonstrate proficiency in caring for vinyl tops--The student will be able to:
05.01	Identify the proper supplies and chemicals needed to care for vehicle vinyl tops.
05.02	Apply vinyl top cleaners.
05.03	Apply vinyl top dressings.
06.0	Degrease and clean vehicle engine compartment--The student will be able to:
06.01	Identify the proper supplies and chemicals needed to clean and recondition vehicle engine compartment.
06.02	Operate a high-pressure washer.
06.03	Degrease engine and engine compartment.
06.04	Select and apply correct color engine paint.

CTE Standards and Benchmarks	
	06.05 Apply clear engine paint.
	06.06 Inspect belts and hoses.
07.0	Perform minor upholstery and vinyl repairs--The student will be able to:
	07.01 Identify the supplies necessary to perform minor upholstery repair.
	07.02 Repair fabric upholstery.
	07.03 Repair vinyl seat upholstery.
	07.04 Repair vinyl dashboards.

Florida Department of Education
Student Performance Standards

Course Number: ARR0612
Occupational Completion Point: C
Automobile Detailer – 150 Hours – SOC Code 53-7061

Course Description:
The Automobile Detailer course is designed to build on the skills and knowledge students learned in Reconditioning Detailer course for entry into the automotive detailing and reconditioning industry. Students explore career opportunities and requirements of a professional auto detailer. Students study applying vinyl pinstripes, and window tints.

CTE Standards and Benchmarks	
08.0	Demonstrate proficiency in applying vinyl pinstripes--The student will be able to:
08.01	Identify the supplies and materials necessary to pinstripe a vehicle.
08.02	Sketch a vehicle pinstripe layout.
08.03	Apply pinstripes to a vehicle.
08.04	Sketch a multi-color graphic design using vinyl material.
09.0	Demonstrate proficiency in applying window tint--The student will be able to:
09.01	Identify the supplies and materials necessary to apply window tint to a vehicle.
09.02	Comply with local and state regulations regarding application of window tint on motor vehicles.
09.03	Apply window tint on flat glass surfaces.
09.04	Apply window tint to curved glass surfaces.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Heavy Equipment Operation**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	I490202
CIP Number	0649020200
Grade Level	30, 31
Standard Length	1200 hours
Teacher Certification	OPER ENGR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	47-2073 – Operating Engineers and Other Construction Equipment Operators 53-7021 – Crane and Tower Operators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 8 Language: 8 Reading: 8

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.

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

Program Structure

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

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 post-secondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0070	Heavy Equipment Maintenance Technician	150 hours	47-2073
B	TRA0086	Tractor Operator	150 hours	47-2073
C	TRA0087 TRA0088	Off-road Equipment Operator 1 Off-road Equipment Operator 2	300 hours 300 hours	47-2073
D	TRA0049	Crane Operator	300 hours	53-7021

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate understanding of procedures.
02.0 Demonstrate understanding of operation and maintenance of mechanical systems and engines.
03.0 Operate pneumatic and crawler -type tractor with attachments.
04.0 Operate a back hoe.
05.0 Operate a motor grader.
06.0 Utilize utility construction equipment as applicable.
07.0 Operate a crane.

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

Course Description:
The Heavy Equipment Maintenance Technician course prepares students for entry into the Heavy Equipment Operations industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study shop safety, mechanical systems, and engines.

CTE Standards and Benchmarks	
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.

Florida Department of Education
Student Performance Standards

Course Number: TRA0086
Occupational Completion Point: B
Tractor Operator – 150 Hours – SOC Code 47-2073

Course Description:
The Tractor Operator course is designed to build on the skills and knowledge students learned in the Heavy Equipment Maintenance Technician course for entry into the Heavy Equipment Operations industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study pneumatic and crawler-type tractor operations.

CTE Standards and Benchmarks	
03.0	Operate pneumatic and crawler-type tractor with attachments--The student will be able to:
03.01	Move, level, and spread top soil.
03.02	Remove stumps.
03.03	Pile debris for burning.
03.04	Remove and replace dozer blade.
03.05	Remove and replace bucket.
03.06	Attach cutting teeth as needed.
03.07	Safely load dump trucks.

Florida Department of Education
Student Performance Standards

Course Number: TRA0087
Occupational Completion Point: C (1 of 2)
Off-road Equipment Operator 1 – 300 Hours – SOC Code 47-2073

Course Description:
The Off-road Equipment Operator 1 course is designed to build on the skills and knowledge students learned in the Tractor Operator course for entry into the Heavy Equipment Operations industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study back hoe, and motor grader operations.

CTE Standards and Benchmarks	
04.0	Operate back hoe--The student will be able to:
04.01	Dig pit to specified grade.
04.02	Observe for cables, pipes, and underground utilities.
04.03	Dig ditches for drainage and pipes.
04.04	Install bucket teeth to back hoe
05.0	Operate a motor grader--The student will be able to:
05.01	Grade to specific levels.
05.02	Apply use of grading stakes when operating motor grade.
05.03	Build a road-bed.
05.04	Perform blue-top grade (finish).
05.05	Change blade and scarifier teeth on motor grader.

Course Number: TRA0088
Occupational Completion Point: C (2 of 2)
Off-road Equipment Operator 2 – 300 Hours – SOC Code 47-2073

Course Description:
The Off-road Equipment Operator 2 course is designed to build on the skills and knowledge students learned in the Off-road Equipment Operator 1 course for entry into the Heavy Equipment Operations industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study utility construction equipment operation.

CTE Standards and Benchmarks	
06.0	Utilize utility construction equipment as applicable--The student will be able to:
06.01	Operate scraper.
06.02	Operate trencher.
06.03	Operate tar kettle.
06.04	Operate rollers.
06.05	Operate concrete mixer.

Florida Department of Education
Student Performance Standards

Course Number: TRA0049
Occupational Completion Point: D
Crane Operator – 300 Hours – SOC Code 53-7021

Course Description:
The Crane Operator course is designed to build on the skills and knowledge students learned in the Off-road Equipment Operator 1 & 2 courses for entry into the Heavy Equipment Operations industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study crane or alternative equipment operation.

CTE Standards and Benchmarks	
07.0	Operate crane or alternative equipment(operating engineer)--The student will be able to:
07.01	Apply safety procedures.
07.02	Review “Construction Industry Manufactures Association” safety manuals.
07.03	Operate crane with drag bucket, clamshell, and hook. (Optional)
07.04	Load dump truck with crane. (Optional)
07.05	Operate alternative equipment

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Solid Waste Collection Equipment Operator**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

NOTE: This program has been **daggered for deletion** with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, **no new students may be enrolled** in this program. Students already enrolled in the program may, at the District or Institution discretion, continue taking courses in the program until completion.

PSAV – Career Preparatory	
Program Number	I490203
CIP Number	0649029900
Grade Level	30, 31
Standard Length	150 hours
Teacher Certification	COMM DRIV @7 7G OPER ENGR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-7081 – Refuse and Recycle Material Collectors
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	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.

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

Program Structure

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

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 post-secondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0071	Solid Waste Collection Equipment Operator	150 hours	53-7081

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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.

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

Course Description:
The Solid Waste Collection Equipment Operator course prepares students for entry into the solid waste service industry. Students study vehicle safety, accident prevention, operating regulations, pre-trip preparation, inspection procedures, maintenance, service, material collection operation, vehicle control procedures, backing, maneuvering, road, and hazardous driving skills.

CTE Standards and Benchmarks	
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:

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Commercial Vehicle Driving**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	I490205
CIP Number	0649020500
Grade Level	30, 31
Standard Length	320 hours
Teacher Certification	COMM DRIV @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-3032 – Heavy and Tractor-Trailer Truck Drivers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	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.
Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point.

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 post-secondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0080	Tractor Trailer Truck Driver	320 hours	53-3032

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
14.0 Explain the importance of employability and entrepreneurship skills.
15.0 Obtain a Florida Commercial Vehicle Driver's License by passing written and performance tests.

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

Course Description:
The Tractor Trailer Truck Driver course prepares students for entry into the trucking and logistics industry. Students explore career opportunities and requirements of a professional tractor trailer driver. Students study vehicle safety, accident prevention, operating regulations, cargo handling, documentation procedures, pre-trip preparation, vehicle inspection, maintenance, service, control procedures, backing, coupling, uncoupling, maneuvering, road and hazardous driving skills, math, communication, employability, entrepreneurship, and licensing requirements.

CTE Standards and Benchmarks	
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 firefighting procedures..
01.03	Utilize seat belts and personal protection gear appropriate to type of operation.
01.04	Demonstrate safe lifting procedures through use of hands-on labs or through viewing safety video.
01.05	Describe personal safety equipment and procedures.
01.06	Describe actions applicable for vehicle accidents.
01.07	Complete reports in a classroom activity (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.
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 including discussion of electronic logs.
	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.
	02.10	Fully understand and comply with Federal Motor Carrier Safety Administration rules and regulations - Compliance, Safety, and Accountability (CSA) particularly the role of drivers and motor carriers.
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	Describe the placement of placards when carrying hazardous materials.
	03.06	Describe procedure for use of common cargo handling equipment, including pallets, jacks, dollies, hand trucks, 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	Describe the handling of 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. Describe the use of manual and contemporary GPS navigation systems.
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 bi-directional reflective triangles 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	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	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 proper gear shifts, 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 acceleration and fuel-efficient performance.
07.10	Select proper gear for speed and highway conditions.
07.11	Operate manual, automatic and semiautomatic transmissions as available training equipment allows.
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 maintain proper operating range/power/RPM of the motor while slowing the vehicle.
07.15	Park the vehicle, set brakes and shut off the engine.
07.16	Properly chock/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	Judge side, rear and overhead clearances and path of the trailer.
08.07	Reverse-steer and articulate a vehicle.
08.08	Align the tractor properly to connect with trailer.
08.09	Back and secure the tractor properly into the trailer kingpin without damage.
08.10	Perform tug test against the locking mechanisms and visual checks to make sure coupling is secure.
08.11	Connect electrical and air lines properly.
08.12	Set in-cab air brake controls properly.
08.13	Retract and secure landing gear after coupling is secure.
08.14	Properly uncouple and secure the trailer.
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	Back 100 feet through an alley.
09.04	Make proper straight in approach to multiple curves (serpentine).
09.05	Drive forward through curves (serpentine) while keeping tires inside of line.
09.06	Properly position unit for backing into a loading dock.
09.07	Properly back to a dock – actual or simulated.
09.08	Properly stop unit within three feet (36") from the end of the alley dock.
09.09	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. Maintain 3 feet or less on right side of vehicle.

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 stops 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	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 toeholds, 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 counter steer 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:
12.01	Demonstrate knowledge of arithmetic operations.
12.02	Analyze and apply data and measurements to solve problems and interpret documents.
13.0	Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:
13.01	Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace.
13.02	Locate, organize and reference written information from various sources.
13.03	Interpret verbal and nonverbal cues/behaviors that enhance communication.
13.04	Apply active listening skills to obtain and clarify information.
13.05	Exhibit public relations skills that aid in achieving customer satisfaction.
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.
14.02	Develop personal career plan that includes goals, objectives, and strategies.
14.03	Examine licensing, certification, and industry credentialing requirements.
14.04	Evaluate and compare employment opportunities that match career goals.
14.05	Identify and exhibit traits for retaining employment.
14.06	Identify opportunities and research requirements for career advancement.
14.07	Research the benefits of ongoing professional development.
14.08	Examine and describe entrepreneurship opportunities as a career planning option.
15.0	Obtain a Florida Commercial Vehicle Driver's License by passing written and performance test--The student will be able to:
15.01	Demonstrate competence in performing basic commercial vehicle driving skills utilizing the CDL testing criteria.
15.02	Demonstrate understanding and knowledge of Florida Commercial Vehicle Driving Laws as required, to safely and legally operate a commercial vehicle.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Commercial Class "B" Driving**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	I490251
CIP Number	0649020502
Grade Level	30, 31
Standard Length	150 hours
Teacher Certification	COMM DRIV @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-3033 – Light Truck or Delivery Service Drivers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	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.
Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point.

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 post-secondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	TRA0084	Truck Driver Heavy Florida Class “B”	150 hours	53-3033

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Apply concepts learned for obtaining a Florida commercial driver's license (CDL).

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

Course Description:
The Truck Driver Heavy Florida Class "B" course prepares students for entry into the trucking and logistics industry. Students explore career opportunities and requirements of a professional class "B" truck driver. Students study vehicle safety, accident prevention, operating regulations, cargo handling, documentation procedures, pre-trip preparation, vehicle inspection, maintenance, service, control procedures, backing, maneuvering, road and hazardous driving skills, and licensing requirements.

CTE Standards and Benchmarks	
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 including discussion of electronic logs.
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	Fully understand and comply with applicable United States Department of Transportation regulations including Federal Motor Carrier Safety Administration rules and regulations - Compliance, Safety, and Accountability (CSA) particularly the role of drivers and motor carriers.
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 including permits when required.
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	Describe the placement of 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	Describe appropriate signatures on delivery receipts and other required forms.
03.09	Prepare a bill of lading.
03.10	Verify door seal number against shipping document.
03.11	Comply with 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	Describe the use of manual and contemporary GPG navigation systems.
04.04	Arrange a secure place for vehicle on layovers, especially when transporting hazardous materials.

	04.05 Demonstrate map reading skills.
	04.06 Estimate travel time and plan rest stops and layovers.
	04.07 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 bi-directional reflective triangles 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, engine and power train, suspension system, tires 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 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 mud/rain flaps.
07.0	Demonstrate basic vehicle control procedures--The student will be able to:

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 (120-140 PSI) in air tanks before releasing brakes.
07.04	Test parking brake and service brake before moving/driving vehicle.
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 non-synchronized transmissions 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 maintain proper operating range/power/RPM of the motor while slowing the vehicle.
07.14	Park the vehicle, set brakes and shut off the engine.
07.15	Properly chock/block wheels where and when required.
08.0	Demonstrate backing skills--The student will be able to:
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	Make proper straight in approach to multiple curves (serpentine).
09.06	Drive forward through curves (serpentine) while keeping tires inside of line.

09.07	Properly position unit for backing into a loading dock.
09.08	Properly back to a dock - Actual or Simulated.
09.09	Properly stop unit within 12 inches of the dock without contacting dock - Actual or Simulated.
09.10	Describe the proper procedures for navigating a weigh station.
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	Execute a right hand turn maintaining 3 feet or less on right side of vehicle.
10.10	Complete a turn promptly and safely and not impede other traffic.
10.11	Select and shift to proper gear prior to beginning any turn.
10.12	Obey all traffic signals.
10.13	Plan stop in advance and adjust speed correctly.
10.14	Use brakes properly on grades.
10.15	Plan stops far enough in advance to avoid hard braking.
10.16	Stop clear of crosswalks.
10.17	Come to a complete stop at all stop signs.
10.18	Yield right of way at intersections having yield signs.
10.19	Check for cross traffic regardless of traffic signals.
10.20	Enter all intersections prepared to stop if necessary.
10.21	Stop a minimum of 15 feet but not more than 50 feet before railroad grade crossing if stop is necessary.
10.22	Select proper gear to avoid shifting gears on railroad grade crossing.
10.23	Determine sufficient space required for passing.
10.24	Pass only in safe locations.

	10.25	Pass on two-lane highway, only when safe to do so.
	10.26	Pass on four or more lane highway.
	10.27	Signal lane changes before and after passing.
	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	Determine minimum front-to-rear distances when following other vehicles using industry recognized standards.
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 or describe 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 extricating the vehicle from snow, sand and mud by maneuvering or towing.

11.12	Demonstrate ability to adjust rate of change in speed and direction to accommodate road conditions to avoid skidding.
11.13	Describe procedures required to coordinate acceleration and shifting to overcome the resistance of snow, sand and mud.
11.14	Demonstrate ability to perform checks on brake adjustment prior to mountain driving.
11.15	Describe procedures required to use right lane or special truck lane going up grades.
11.16	Describe procedures required to place transmission in appropriate gear for engine braking before starting downgrade.
11.17	Describe procedures required to use proper braking techniques and maintain proper engine braking before starting downgrades.
11.18	Describe proper use of truck escape ramp when brakes fail on a downgrade.
11.19	Describe procedure required for observing temperature gauge frequently when pulling heavy loads up long grades.
11.20	Describe the effect of vehicle weight and speed upon braking and shifting ability on long downgrades.
11.21	Identify the meaning and use of percent of grade signs.
11.22	Demonstrate bringing the truck to a stop in the shortest possible distance while maintaining directional control on a dry surface.
11.23	Describe procedures to make an evasive turn off the roadway and return to the roadway while maintaining directional control.
11.24	Describe procedures to bring the vehicle to a stop in the event of a brake failure.
11.25	Describe procedures to maintain control of the vehicle in the event of a blowout.
11.26	Describe procedures to bring truck to a stop in the shortest possible distance while maintaining directional control when operating on a slippery surface.
11.27	Describe procedures to recover from vehicle skids induced by snow, ice, water, oil, sand, wet leaves or other slippery surfaces.
11.28	Describe procedures to countersteer out of a skid in a way that will regain directional control and not produce another skid.
11.29	Describe procedure to operate brakes properly to provide maximum braking without loss of control.
12.0	Apply concepts learned for obtaining a Florida commercial driver's license (CDL)--The student will be able to:
12.01	Demonstrate competence in performing basic commercial vehicle driving skills utilizing the Florida CDL testing criteria.
12.02	Demonstrate understanding and knowledge of Florida Commercial Vehicle Driving Laws as required, to safely and legally operate a commercial vehicle.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Commercial Fishing**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

NOTE: This program has been **daggered for deletion** with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, **no new students may be enrolled** in this program. Students already enrolled in the program may, at the District or Institution discretion, continue taking courses in the program until completion.

PSAV – Career Preparatory	
Program Number	I490303
CIP Number	0649030300
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	COMM FISH 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	53-5021 – Captains, Mates, and Pilots of Water Vessels
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to, 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.

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.

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

Program Structure

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

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 post-secondary program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	MTE0880	Officer or Fishing Vessel Captain 1	375 hours	53-5021
B	MTE0881	Officer or Fishing Vessel Captain 2	375 hours	53-5021

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Perform shrimp boat deckhand duties.
08.0 Perform net fisher duties.
09.0 Perform pot fisher duties.
10.0 Perform line fisher duties.
11.0 Bring vessel into port.
12.0 Perform crew operational and maintenance duties aboard a vessel in port.
13.0 Prepare meals aboard vessel.
14.0 Plan and perform emergency procedures.
15.0 Demonstrate appropriate communication skills.
16.0 Demonstrate appropriate math skills.
17.0 Demonstrate appropriate understanding of basic science.
18.0 Demonstrate employability skills.
19.0 Demonstrate an understanding of entrepreneurship.

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

Course Description:
The Officer or Fishing Vessel Captain 1 course prepares students for entry into the commercial fishing industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study vessel underway procedures, docking, vessel operation, maneuvering, anchoring, and cargo handling duties.

CTE Standards and Benchmarks	
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	Use proper testing procedure to determine if all navigation lights are functioning.
01.06	Use a torque wrench to tighten engine mounts to predetermined level.
01.07	Inspect water level indicators for cleanliness.
01.08	Test marine radio equipment using proper technique.
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 apparatuses 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.

CTE Standards and Benchmarks	
	01.17 Use a voltage meter to 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 Demonstrate how to 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 Demonstrate how to secure mooring lines to dock.
	02.08 Demonstrate how to secure mooring lines to vessel.
	02.09 Summarize the steps for securing the engine room.
	02.10 Secure propeller shaft.
	02.11 Inspect engine room equipment for proper maintenance and safety.
	02.12 Determine the 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 Demonstrate how to splice an 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 Use a volt meter to determine if electrical outlets have proper voltage.
	03.04 Change air filters on engines.
	03.05 Change oil and fuel filters on engines.

CTE Standards and Benchmarks	
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 from different sources.
03.18	Determine "distance off" by using angular measurements.
03.19	Establish a vessel's dead reckoning (DR) track.
03.20	Plot position by using GPS and GPS overprint charts.
03.21	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	Demonstrate the proper method to secure hoses on board vessel.
04.05	Demonstrate the proper methods to 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.

CTE Standards and Benchmarks	
	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.

Florida Department of Education
Student Performance Standards

Course Number: MTE0881
Occupational Completion Point: B
Officer or Fishing Vessel Captain 2 – 375 Hours – SOC Code 53-5021

Course Description:
The Officer or Fishing Vessel Captain 2 course is designed to build on the skills and knowledge students learned in the Officer or Fishing Vessel Captain 1 course for entry into the commercial fishing industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study deckhand, net fisher, pot fisher and line duties, bringing vessels into port, crew operations and maintenance, preparing meals, emergency procedures, math, science, and employability skills, and entrepreneurship.

CTE Standards and Benchmarks	
07.0	Perform shrimp boat deckhand duties--The student will be able to:
07.01	Stand lookout, steering, and engine room watches.
07.02	Attach nets, slings, hooks, and other lifting devices to cables, booms, and hoists.
07.03	Load equipment and supplies aboard vessel by hand or using hoisting equipment.
07.04	Signal other workers to move, hoist, and position loads.
07.05	Attach accessories, such as floats, weights, and markers to nets and lines.
07.06	Pull and guide nets and lines onto vessel.
07.07	Remove shrimp from nets.
07.08	Sort, clean and identify marine life and return undesirable and illegal catch to the sea.
07.09	Operate brine tank and refrigeration equipment.
07.10	Place catch in containers and store in hold and cover with salt and ice.
07.11	Wash decks, conveyors, knives, and other equipment, using proper sanitary procedures.
07.12	Lubricate, adjust, and make minor repairs to engines and equipment.
08.0	Perform net fisher duties--The student will be able to:
08.01	Demonstrate proper procedures to catch finfish, shellfish, and other marine life alone or as crew.
08.02	Use and operate equipment such as dip, diver, gill, hoop, lampara, pound, trap, reef, trammel, and travel nets.
08.03	Use and operate equipment such as purse seine, haul, drag, or beach seine.

CTE Standards and Benchmarks		
	08.04	Insert and attach hoops, rods, poles, ropes, floats, weights, beam runners, other boards, and cables to form, reinforce, position, set tow and anchor net.
	08.05	Attach flags and lights to buoys to identify net location.
	08.06	Put net into water and anchor or tow net according to kind of net used, location of fishing area, and method of fishing.
	08.07	Haul net to boat or shore manually and using winch.
	08.08	Empty catch from net, using dip net, brail bucket, hydraulic pump, and conveyor, and by lifting net, using block and tackle, and dumping catch.
	08.09	Store catch in hold and containers, or transfer catch to base ship or bigger boat.
	08.10	Ride in skiff and hold end of net as base ship discharges net to surround school of fish or other seafood.
	08.11	Sort and clean fish.
	08.12	Repair fishing nets and gear.
	08.13	Act as lookout or observe instruments to sight schools of fish.
09.0	Perform pot fisher duties--The student will be able to:	
	09.01	Fish for marine life, including crab, eel, or lobster, using pots (cages with funnel-shaped net openings).
	09.02	Tie marker float to line, attach line to pot, fasten bait inside pot, and lower pot into water.
	09.03	Hook marker float with pole and pull up pot.
	09.04	Reach through hinged door of pot to remove catch or dump catch on deck.
	09.05	Measure catch with fixed gauge to insure compliance with legal size.
	09.06	Place legal catch in container and toss illegal catch overboard.
	09.07	Rubber band claws to prevent lobsters in container from killing each other.
	09.08	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.
10.0	Perform line fisher duties--The student will be able to:	
	10.01	Catch fish and other marine life with hooks and lines, working alone or as a member of crew.
	10.02	Lay out line and attach hooks, bait, sinkers, and various anchors, floats, and swivels, depending on the targeted species sought.
	10.03	Put line into water, and hold, anchor, or troll (tow) line to catch fish.
	10.04	Haul line onto boat deck by hand, reel, or synch, and remove catch.
	10.05	Store catch in hold or boxes and pack catch in ice.
	10.06	Hit fish with club to stun it before removing it from hook.

CTE Standards and Benchmarks	
	10.07 Use gaff to assist in lifting fish from water and placing them on the deck.
	10.08 Use proper and safe technique to slit fish, remove viscera, and wash cavity to clean fish for storage.
	10.09 Navigate vessel in fishing area safely and legally.
11.0	Bring vessel into port--The student will be able to:
	11.01 Determine approximate position and hazardous conditions by using depth recorder.
	11.02 Determine position by using GPS satellite information.
	11.03 Determine vessel's course and position against dead reckoning plots.
12.0	Perform crew operational and maintenance duties aboard vessel in port--The student will be able to:
	12.01 Prepare and perform necessary duties for dry-docking a vessel.
	12.02 Change lube oil filters on auxiliary engines.
	12.03 Change fuel filters on auxiliary engines.
	12.04 Clean electric motor.
	12.05 Prepare a list of hoses, valves, connections, gaskets, and tanks that have been determined to need repairs.
	12.06 Determine if const-a-voltage regulator is functioning properly.
	12.07 Determine if drive bolts on air compressors are excessively loose.
	12.08 Tighten panel box fittings to prevent vibration.
	12.09 Clean keel cool strainers.
	12.10 Clean oil coolers.
	12.11 Clean oil strainers in marine gears.
	12.12 Drain water out of fuel traps.
	12.13 Check tightness of fuel and oil line connections on engines and tighten if necessary.
	12.14 Inspect day tanks containing fuel for leaks.
	12.15 Lubricate deck and engine room equipment on a regular schedule.
	12.16 Determine vessel's manning requirements.
	12.17 Wash down vessel's superstructure and decks.
13.0	Prepare meals aboard vessel--The student will be able to:
	13.01 Make yeast breads.

CTE Standards and Benchmarks
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 using proper sanitary procedures.
13.28 Order food.

CTE Standards and Benchmarks	
	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:

CTE Standards and Benchmarks	
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 PSI, inches of mercury, and KPA.
18.0	Demonstrate employability skills--The student will be able to:
18.01	Conduct a job search using periodicals and the internet.
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 and the ability to locate on-line 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.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

NOTE: This program has been **daggered for deletion** with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, **no new students may be enrolled** in this program. Students already enrolled in the program may, at the District or Institution discretion, continue taking courses in the program until completion. The replacement enrollment option for students is the Marine Service Technologies (T400210) PSAV course.

PSAV – Career Preparatory	
Program Number	I490306
CIP Number	0647061600
Grade Level	30,31
Standard Length	1350 hours
Teacher Certification	DIESEL MECH @7 7G GASENG RPR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051 – Motorboat Mechanics and Service Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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 hours	49-3051
B	MTE0050	Outboard Engine Technician 1	300 hours	49-3051
C	MTE0070	Outboard Engine Technician 2	300 hours	49-3051
D	MTE0183	Stern Drive Technician	150 hours	49-3051
E	MTE0054	Inboard Gas Technician	150 hours	49-3051
F	MTE0056	Inboard Diesel Technician	150 hours	49-3051

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Perform gasket/seal operations and electronic test skills to industry standards.
14.0 Maintain and repair basic two stroke cycle outboard engines.
15.0 Maintain and repair outboard fuel systems.
16.0 Maintain and repair outboard cooling systems.
17.0 Maintain and repair outboard lubrication systems.
18.0 Maintain and repair outboard lower gear cases.
19.0 Maintain and repair outboard cranking systems.
20.0 Maintain and repair outboard magneto systems.
21.0 Maintain and repair outboard battery ignition systems.
22.0 Maintain and repair outboard capacitor discharge ignition systems.
23.0 Maintain and repair outboard charging systems.
24.0 Perform outboard upper to lower gear case maintenance.
25.0 Assemble and maintain outboard lower units and housing assemblies.
26.0 Maintain and repair basic four-stroke cycle stern drive engines.
27.0 Maintain and repair stern drive fuel systems.
28.0 Maintain and repair stern drive cooling systems.
29.0 Maintain and repair stern drive lubrication systems.
30.0 Maintain and repair stern drive upper gear case.
31.0 Maintain and repair stern drive lower gear case.
32.0 Maintain and repair stern drive battery ignition.
33.0 Maintain and repair stern drive; capacitor discharge ignition system.
34.0 Maintain and repair stern drive intermediate housing.
35.0 Perform parts manual activities to industry standards.
36.0 Maintain and repair basic four-stroke cycle inboard gas engine.
37.0 Maintain and repair inboard fuel systems.
38.0 Maintain and repair inboard gas cooling systems.

39.0 Maintain and repair inboard gas lubrication systems.
40.0 Maintain and repair inboard gas fuel systems.
41.0 Maintain and repair inboard gas transmissions.
42.0 Maintain and repair inboard diesel fuel systems.
43.0 Maintain and repair inboard diesel cooling systems.
44.0 Maintain and repair inboard diesel lubrication systems.
45.0 Maintain and repair inboard diesel charging systems.

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

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, high performance related equipment, and fuel systems.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
	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.)

CTE Standards and Benchmarks	
	05.06 Locate and identify fuel pumps and test the vacuum and pressure.
	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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks
12.03 Identify and locate components of lubrication systems.

Florida Department of Education
Student Performance Standards

Course Number: MTE0050
Occupational Completion Point: B
Outboard Engine Technician 1 – 300 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
13.0	Perform gasket/seal operations and electronic test equipment skills to industry standards--The student will be able to:
13.01	Identify and make gaskets and seals.
13.02	Demonstrate appropriate skills in computerized test equipment.
14.0	Maintain and repair basic two-stroke cycle outboard engines--The student will be able to:
14.01	Disassemble engines.
14.02	Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
14.03	Diagnose head problems by use of the visual inspection method.
14.04	Diagnose head problems by use of the compression tester method.
14.05	Diagnose head problems by use of cylinder air pressure method.
14.06	Diagnose head problems by use of the stethoscope method.
14.07	Remove, clean and inspect piston rods and assemblies.
14.08	Measure out-of-round of pistons and cylinders.
14.09	Hone cylinders.
14.10	Check the total bearing surface of connecting rod bearings.
14.11	Measure piston skirts and ring grooves.
14.12	Measure the piston ring gap in cylinder bores.
14.13	Install piston pins according to manufacturer's specifications.
14.14	Check rod and piston assembly alignment.
14.15	Install rings on pistons.

CTE Standards and Benchmarks	
	14.16 Install piston rod assemblies.
	14.17 Measure and check crankshafts with a micrometer.
	14.18 Check needle bearings.
	14.19 Inspect crankshafts and install seal.
	14.20 Inspect, clean and/or replace reed valves.
	14.21 Reassemble engines.
15.0	Maintain and repair outboard fuel systems--The student will be able to:
	15.01 Identify the major types of carburetors.
	15.02 Check and adjust throttle and governor linkages.
	15.03 Identify and service different types of EFI systems.
	15.04 Remove, service and replace air cleaners.
	15.05 Diagnose carburetor problems.
16.0	Maintain and repair outboard cooling systems--The student will be able to:
	16.01 Disassemble, examine for problems and reassemble water pumps.
	16.02 Remove, check and replace thermostats.
	16.03 Use thermostat pressure relief systems.
	16.04 Service manifolds and thermostat housings.
17.0	Maintain and repair outboard lubrication systems--The student will be able to:
	17.01 Check engines for oil leaks.
	17.02 Change engine oil and filters.
	17.03 Check engine oil pressure and level.
	17.04 Recognize and use only recommended oil.
	17.05 Inspect and service oil-metering systems.
18.0	Maintain and repair outboard lower gear cases--The student will be able to:
	18.01 Remove and replace lower gear cases.
	18.02 Reshim lower gear cases.
	18.03 Refill lower gear cases with specified oil.
	18.04 Determine propeller pitch diameter and hub type.

Florida Department of Education
Student Performance Standards

Course Number: MTE0070
Occupational Completion Point: C
Outboard Engine Technician 2 – 300 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
19.0	Maintain and repair outboard cranking systems--The student will be able to:
19.01	Disassemble recoil starters.
19.02	Inspect components of recoil starters.
19.03	Reassemble recoil starters.
19.04	Identify components of electrical starting systems.
19.05	Disassemble different types of starting motors.
19.06	Bench test drive units.
19.07	Bench test switches.
19.08	Bench test minor parts of starting motor components.
19.09	Install, reassemble and test new starter parts.
19.10	Troubleshoot starting systems using battery starter testers.
19.11	Set up and use battery starter (load) testers.
19.12	Locate opens, short and grounds.
20.0	Maintain and repair outboard magneto ignition systems--The student will be able to:
20.01	Sketch and label electrical symbols.
20.02	Set up and use ohmmeters.
20.03	Set up and use voltmeters.
20.04	Set up and use ignition testers.
20.05	Set up and use ignition analyzers.

CTE Standards and Benchmarks	
	20.06 Locate and identify parts of magneto ignitions.
	20.07 Locate and match electrical units by their symbols on a wiring diagram.
	20.08 Sketch and label complete magneto ignition systems.
	20.09 Check coil resistance with an ohmmeter.
	20.10 Check points for continuity and resistance.
	20.11 Check condensers for capacity, leaks and shorts.
	20.12 Clean and regap spark plugs.
21.0	Maintain and repair outboard battery ignition systems--The student will be able to:
	21.01 Locate and identify parts of battery ignition systems.
	21.02 Locate and match electrical units by their symbols on a wiring diagram.
	21.03 Sketch and label complete battery ignition systems.
	21.04 Check coil resistance with an ohmmeter.
	21.05 Check points for continuity and resistance.
	21.06 Check condensers for capacity, leaks and shorts.
	21.07 Set up and use test equipment.
	21.08 Set timing using timing light.
22.0	Maintain and repair outboard capacitor discharge ignition systems--The student will be able to:
	22.01 Sketch and label electrical symbols.
	22.02 Set up and use ohmmeters.
	22.03 Set up and use a CD-77 or equivalent.
	22.04 Set up and use spark testers.
	22.05 Set up and use neon test lights.
	22.06 Set up and use low/high ammeters.
	22.07 Set up and use voltmeters.
	22.08 Locate and identify parts of capacitor discharge ignition systems.
	22.09 Locate and match electrical units by their symbols on a wiring diagram.
	22.10 Sketch and label complete C/D ignition systems.

CTE Standards and Benchmarks	
	22.11 Check coil resistance, shorts and grounds with an ohmmeter.
	22.12 Check stator windings with an ohmmeter.
	22.13 Check sensor coils, charge coils, ignition coils and shorts to ground with a CD-77 or equivalent.
	22.14 Check power packs with an ohmmeter and a CD-77 equivalent.
23.0	Maintain and repair outboard charging systems--The student will be able to:
	23.01 Sketch and label the units of complete charging circuits.
	23.02 Disassemble charging systems and identify the components.
	23.03 Perform stator and rectifier testing on charging systems.
	23.04 Reassemble and test charging systems.
	23.05 Set up and use ohmmeters.
	23.06 Test regulators.
	23.07 Reassemble and test complete units.
24.0	Perform outboard upper to lower gear case maintenance--The student will be able to:
	24.01 Disassemble exhaust housings.
	24.02 Inspect seals, "O" rings, shafts and bearings.
	24.03 Reassemble exhaust housings.
25.0	Assemble and maintain outboard lower units and housing assemblies--The student will be able to:
	25.01 Disassemble and reassemble steering handle groups.
	25.02 Disassemble and assemble exhaust housings and water tube assemblies.
	25.03 Replace motor mounts and shock absorbers.
	25.04 Lubricate all fittings.
	25.05 Pressure and vacuum test gear cases.
	25.06 Remove and test cylinders and rams.
	25.07 Adjust reverse locks.
	25.08 Adjust the trim and tilt.
	25.09 Determine the differences between mechanical, electrical and hydraulic shifting units.
	25.10 Explain the shifting theory of the lower unit.

CTE Standards and Benchmarks
25.11 Disassemble and reassemble mechanical shifting units.
25.12 Disassemble and reassemble electrical shifting units.
25.13 Disassemble and reassemble hydraulic shifting units.
25.14 Inspect all parts for wear.

Florida Department of Education
Student Performance Standards

Course Number: MTE0183
Occupational Completion Point: D
Stern Drive Technician – 150 Hours – SOC Code 49-3051

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, upper and lower gear case assemblies.

CTE Standards and Benchmarks	
26.0	Maintain and repair basic four-stroke cycle stern drive engines--The student will be able to:
26.01	Diagnose valve and head problems by use of the visual inspection method.
26.02	Diagnose valve and head problems by use of the compression tester method.
26.03	Diagnose valve and head problems by use of the cylinder air pressure method.
26.04	Disassemble engines and inspect parts.
26.05	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
26.06	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
26.07	Check and inspect springs for free height, distortion and installed height.
26.08	Adjust valve lash.
26.09	Move and inspect camshafts and lifters.
26.10	Measure camshafts.
26.11	Clean and inspect lifters for wear.
26.12	Time valve drive assemblies.
26.13	Remove pistons from rod assemblies.
26.14	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
26.15	Check piston pins and bosses for wear.
26.16	Measure piston ring lands width, out-of-round and taper.
26.17	Measure the piston ring gap in cylinder bores.

CTE Standards and Benchmarks	
26.18	Install and fit piston pins.
26.19	Check rod and piston assembly alignment.
26.20	Remove and replace rod bearings.
26.21	Hone and clean cylinders.
26.22	Install rings on pistons.
26.23	Measure and check crankshafts with a micrometer.
26.24	Check for end play.
26.25	Check bearing bores with a telescoping gage.
26.26	Reassemble engines.
26.27	Install oil seals.
27.0	Maintain and repair stern drive fuel systems--The student will be able to:
27.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
27.02	Sketch and label the parts of total fuel systems.
27.03	Service fuel lines.
27.04	Remove, clean and install fuel tanks.
27.05	Identify and locate fuel pump vacuums.
27.06	Remove, replace service and check the pressure of fuel pumps.
27.07	Remove, clean and replace in-line filters.
27.08	Identify the major types of carburetors.
27.09	Check and adjust throttle and governor linkages.
27.10	Identify and service different types of EFI systems.
27.11	Identify and understand different types of evaporative control systems.
28.0	Maintain and repair stern drive cooling systems--The student will be able to:
28.01	Explain the principles of cooling systems, including fresh water cooling systems.
28.02	Trace water flow through cooling systems.
28.03	Disassemble and reassemble water pumps.
28.04	Remove, check and replace thermostats.

CTE Standards and Benchmarks	
	28.05 Use thermostat pressure relief systems.
	28.06 Service manifolds, risers and thermostat housings.
	28.07 Service water-cooling systems for gas inboard.
29.0	Maintain and repair stern drive lubrication systems--The student will be able to:
	29.01 Identify the types and functions of lubrication systems.
	29.02 Explain the principles of lubrication systems.
	29.03 Identify and locate components of lubrication systems.
	29.04 Check engines for oil leaks.
	29.05 Change engine oil and filters.
	29.06 Check engine oil pressure and level.
	29.07 Recognize and use only recommended oil.
30.0	Maintain and repair stern drive upper gear case--The student will be able to:
	30.01 Determine the differences between mechanical, electrical and hydraulic shifting units.
	30.02 Disassemble and reassemble each type of shifting unit.
	30.03 Reshim units to manufacturers' specifications.
	30.04 Use the proper oil to refill upper and lower gear cases.
31.0	Maintain and repair stern drive lower gear cases--The student will be able to:
	31.01 Determine the differences between mechanical, electrical and hydraulic shifting.
	31.02 Remove and replace lower gear cases.
	31.03 Reshim lower gear cases.
	31.04 Refill lower gear cases with specified oil.
	31.05 Determine propeller pitch, diameter and hub type.
32.0	Maintain and repair stern drive battery ignition systems--The student will be able to:
	32.01 Locate and match electrical units by their symbols on a wiring diagram.
	32.02 Sketch and label complete battery ignition systems.
	32.03 Set up and use test equipment.
	32.04 Set timing using a timing light

CTE Standards and Benchmarks	
33.0	Maintain and repair stern drive capacitor discharge ignition systems--The student will be able to:
33.01	Sketch and label electrical symbols.
33.02	Set up and use ohmmeters.
33.03	Set up and use appropriate test equipment.
33.04	Set up and use spark testers.
33.05	Set up and use neon test lights.
33.06	Set up and use low/high ammeters.
33.07	Set up and use voltmeters.
33.08	Locate and identify parts of capacitor discharge ignition systems.
33.09	Locate and match electrical units by their symbols on a wiring diagram.
33.10	Sketch and label complete C/D ignition systems.
33.11	Check coil resistance, shorts and grounds with an ohmmeter.
33.12	Check stator windings with an ohmmeter.
33.13	Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment.
33.14	Check power packs with an ohmmeter and appropriate test equipment.
34.0	Maintain and repair stern drive intermediate housings--The student will be able to:
34.01	Disassemble main drive shafts.
34.02	Shim drive shafts to intermediate housings.
34.03	Remove and replace clutch assemblies.
34.04	Check electrical components with proper test equipment.
34.05	Remove and replace "U" joints.
34.06	Disassemble outer transom plates.
34.07	Adjust trim and limit switches.
34.08	Disassemble cylinder rams.
34.09	Service and install trim and tilt systems.
34.10	Remove and test cylinder rams.
34.11	Adjust reverse locks.

CTE Standards and Benchmarks
34.12 Adjust the trim and tilt.

Florida Department of Education
Student Performance Standards

Course Number: MTE0054
Occupational Completion Point: E
Inboard Gas Technician – 150 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
35.0	Perform parts manual activities to industry standards--The student will be able to:
35.01	Read and use parts manuals.
36.0	Maintain and repair basic four-stroke cycle inboard gas engines--The student will be able to:
36.01	Diagnose valve and head problems by use of the visual inspection method.
36.02	Diagnose valve and head problems by use of the compression tester method.
36.03	Diagnose valve and head problems by use of the cylinder air pressure method.
36.04	Disassemble engines and inspect parts.
36.05	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
36.06	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
36.07	Check and inspect springs for free height, distortion and installed height.
36.08	Adjust valve lash.
36.09	Remove and inspect camshafts and lifters.
36.10	Measure camshafts.
36.11	Clean and inspect lifters for wear.
36.12	Time valve drive assemblies.
36.13	Remove pistons from rod assemblies.
36.14	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
36.15	Check piston pins and bosses for wear.
36.16	Measure piston ring lands width, out-of-round and taper.

CTE Standards and Benchmarks	
36.17	Measure the piston ring gap in cylinder bores.
36.18	Install and fit piston pins.
36.19	Check rod and piston assembly alignment.
36.20	Remove and replace rod bearings.
36.21	Hone and clean cylinders.
36.22	Install rings on pistons.
36.23	Measure and check crankshafts with a micrometer.
36.24	Check for end play.
36.25	Check bearing bores with a telescoping gage.
36.26	Reassemble engines.
36.27	Install oil seals.
37.0	Maintain and repair inboard fuel systems--The student will be able to:
37.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
37.02	Sketch and label the parts of total fuel systems.
37.03	Service fuel lines.
37.04	Remove, clean and install fuel tanks.
37.05	Identify and locate fuel pump vacuums.
37.06	Remove, replace service and check the pressure of fuel pumps.
37.07	Remove, clean and replace in-line filters.
37.08	Identify the major types of carburetors.
37.09	Check and adjust throttle and governor linkages.
37.10	Identify and service different types of EFI systems.
37.11	Identify and understand different types of evaporative control systems.
38.0	Maintain and repair inboard gas cooling systems--The student will be able to:
38.01	Explain the principles of cooling systems, including fresh water cooling systems.
38.02	Trace water flow through cooling systems.
38.03	Disassemble and reassemble water pumps.

CTE Standards and Benchmarks	
	38.04 Remove, check and replace thermostats.
	38.05 Use thermostat pressure relief systems.
	38.06 Service manifolds, risers and thermostat housings.
	38.07 Service water-cooling systems for gas inboard, gas outboard and diesel engines.
39.0	Maintain and repair inboard gas lubrication systems--The student will be able to:
	39.01 Identify the types and functions of lubrication systems.
	39.02 Explain the principles of lubrication systems.
	39.03 Identify and locate components of lubrication systems.
	39.04 Check engines for oil leaks.
	39.05 Change engine oil and filters.
	39.06 Check engine oil pressure and level.
	39.07 Recognize and use only recommended oil.
40.0	Maintain and repair inboard gas fuel systems--The student will be able to:
	40.01 Remove, service and replace carburetor air cleaners/flame arrestors.
	40.02 Identify and locate fuel system components (fuel pumps, carburetors and air filters, linkages and intake manifolds).
	40.03 Remove, clean, overhaul, replace and make final adjustments to carburetors.
41.0	Maintain and repair transmissions--The student will be able to:
	41.01 Inspect planetary clutch plate air coupling assemblies
	41.02 Remove and replace transmissions.
	41.03 Use proper service tools in shimming, reassembly and testing.
	41.04 Drain transmissions.
	41.05 Determine capacity using the transmission service manuals.
	41.06 Refill transmissions according to manufacturers' specifications.

Florida Department of Education
Student Performance Standards

Course Number: MTE0056
Occupational Completion Point: F
Inboard Diesel Technician – 150 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
42.0	Maintain and repair inboard diesel fuel systems--The student will be able to:
42.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
42.02	Sketch and label the parts of total fuel systems.
42.03	Service fuel lines.
42.04	Remove, clean and install fuel tanks.
42.05	Identify and locate fuel control devices.
42.06	Remove, replace service and check the pressure of fuel pumps.
42.07	Remove, clean and replace in-line filters.
42.08	Check and adjust throttle and governor linkages.
42.09	Check fuel systems for leaks.
42.10	Bleed systems for starting.
42.11	Adjust nozzle pressure to manufacturer's specifications.
42.12	Set the injection pump angle (timing).
42.13	Check or replace glow plugs.
42.14	Check; stop solenoids.
43.0	Maintain and repair inboard diesel cooling systems--The student will be able to:
43.01	Disassemble and reassemble water pumps.
43.02	Remove, check and replace thermostats.
43.03	Use thermostat pressure relief systems.

CTE Standards and Benchmarks	
	43.04 Service manifolds, risers and thermostat housings.
	43.05 Service water-cooling systems for diesel engines.
44.0	Maintain and repair inboard diesel lubrication systems--The student will be able to:
	44.01 Identify the types and functions of lubrication systems.
	44.02 Explain the principles of lubrication systems.
	44.03 Identify and locate components of lubrication systems.
	44.04 Check engines for oil leaks.
	44.05 Change engine oil and filters.
	44.06 Check engine oil pressure and level.
	44.07 Recognize and use only recommended oil.
45.0	Maintain and repair inboard diesel charging systems--The student will be able to:
	45.01 Inspect, remove and replace alternator belts.
	45.02 Check the output of charging systems.
	45.03 Analyze malfunctions.
	45.04 Test and overhaul alternators.
	45.05 Remove and replace regulators.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Global Logistics and Supply Chain Technology**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T300100
CIP Number	0652020300
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	LOG TECH 7G BUS ED 1
CTSO	SkillsUSA
SOC Codes (all applicable)	11-3071 – Transportation, Storage, and Distribution Managers 43-5071 – Shipping, Receiving, and Traffic Clerks 13-1081 – Logisticians 15-1151 – Computer User Support Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to: 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.

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

Program Structure

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

Students who successfully complete **Information Technology Assistant (Course Number - OTA0040)** may be used as an equivalent substitute for **Material Handler (Course Number - TRA0181)**.

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 hours	11-3071
B	TRA0181	Material Handler	150 hours	15-1151
C	TRA0182	Shipping, Receiving and Traffic Clerk	150 hours	43-5071
D	TRA0183	Logistics Technician	150 hours	13-1081

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 knowledge and skill of information technology applications related to logistics and supply chain management.
06.0 Demonstrate knowledge and skill of common software applications.
07.0 Demonstrate knowledge and skill in using technology to enhance the effectiveness of communication skills utilizing word processing applications.
08.0 Demonstrate knowledge and skill in using technology to enhance communication skills utilizing presentation applications.
09.0 Demonstrate knowledge and skill in using technology to enhance the effectiveness of communication utilizing spreadsheet and database applications.
10.0 Demonstrate knowledge and skill in using technology to enhance communication skills utilizing electronic mail.
11.0 Demonstrate proficiency using computer networks, internet, and online databases to facilitate collaborative communication.
12.0 Develop an awareness of emerging technologies.
13.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
14.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
15.0 Demonstrate an understanding of warehouse operations
16.0 Demonstrate an understanding of storage and control operations
17.0 Demonstrate an understanding of protection skills
18.0 Demonstrate an understanding of economics
19.0 Demonstrate an understanding of career readiness
20.0 Demonstrate employability skills
21.0 Demonstrate competencies in a specific career
22.0 Demonstrate career acquisition
23.0 Demonstrate career retention
24.0 Demonstrate integrated learning and life skills
25.0 Demonstrate technology and information

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

Course Description:
The Packer course prepares students for entry into the logistics and supply chain industry. Students explore career opportunities and requirements of a professional logistician. Content emphasizes beginning skills key to the success of working in the logistics and supply chain industry. Students study and gain a basic understanding of global logistics and supply chain technology, transportation systems, communication skills, and customer service skills.

CTE Standards and Benchmarks	
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 industry.
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 and financial impacts of logistics activities.
01.09	Describe the alignment between the 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 and costs for mode selection to enhance rapid decision making.

CTE Standards and Benchmarks	
	02.05 Give examples of transportation documentation, dispatch, routing and tracking.
	02.06 Describe and assess global freight transportation systems.
	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.
	03.12 Read and comprehend technical and non-technical reading assignments related to course content, including, books, magazines and electronic sources.
	03.13 Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.
	03.14 Apply the writing process to the creation of appropriate documents following designated business formats. (e.g., note taking, research, MLA/APA)
	03.15 Demonstrate an awareness of project management concepts and tools. (e.g., timelines, deadlines, resource allocation, time management, delegation of tasks, collaboration)
04.0	Demonstrate customer service skills--The student will be able to:
	04.01 Exhibit acceptable workplace dress or attire.
	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.

CTE Standards and Benchmarks	
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.

Florida Department of Education
Student Performance Standards

Course Number: TRA0181
Occupational Completion Point: B
Material Handler – 150 Hours – SOC Code 11-3071

Course Description:
The Material Handler course is designed to build on the skills and knowledge students learned in the Packer course for entry into the logistics and supply chain industry. Students explore career opportunities and requirements of a professional logistician. Content emphasizes knowledge and skills of information technology applications, common software applications, word processing, presentation, spreadsheet, and database applications. Additionally, content knowledge and skills related to electronic communication methods, understanding computer networking, awareness of emerging technologies, college and career readiness, and appropriate leadership techniques.

CTE Standards and Benchmarks	
05.0	Demonstrate knowledge and skill of information technology applications related to logistics and supply chain management. – The student will be able to:
05.01	Describe the impact of technology on society.
05.02	Develop keyboarding skills to enter and manipulate text and data.
05.03	Explain main uses of computer systems by front-line workers.
05.04	Identify technologies used to capture and store logistics information.
05.05	Explain the concepts and use of various information technologies in logistics.
05.06	Research, describe, access, and evaluate Internet-based business models.
05.07	Describe and use current and emerging computer technologies and software to perform business tasks.
05.08	Identify and describe types of file systems and classify common file extensions based on software application programs.
05.09	Use reference materials. (e.g. on-line help, tutorials, manuals, vendor bulletin boards)
05.10	Demonstrate basic computer file management skills and file naming conventions to accurately organize files into hierarchies by labeling file folders for easy accessibility.
05.11	Describe and understand the general architecture of a microcomputer system.
05.12	Discuss the process of troubleshooting problems with computer hardware, input and output devices.
05.13	Differentiate between diagnosing and troubleshooting.
05.14	Explain the need for and use of peripherals.

CTE Standards and Benchmarks	
	05.15 Describe ethical issues and problems associated with computers and information systems, including federal laws against anti-piracy with computers and PC software security protection.
	05.16 Demonstrate proficiency with file management and structure. (e.g., folder creation file creation, backup copy, delete, open, save)
	05.17 Compare and contrast various computer operating systems.
	05.18 Select and apply an information technology application for procurement, acquisition, logistics, and supply chain management.
06.0	Demonstrate knowledge and skill of common software applications. – The student will be able to:
	06.01 Compare and contrast the appropriate use of various software applications. (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music)
	06.02 Demonstrate the use of various software applications. (e.g., word processing, desktop publishing, graphics design, web browser, e-mail, presentation, database, scheduling, financial management, Java applet, music).
	06.03 Describe and identify language terminology. (e.g., HTML, Python, Java, flash, Basic, etc.)
07.0	Demonstrate knowledge and skill in using technology to enhance the effectiveness of communication skills utilizing word processing applications. – The student will be able to:
	07.01 Select and use word processing software and accompanying features to enhance written business communications.
	07.02 Share and maintain documents by applying different views and protection to a document and manage document versions.
	07.03 Share and save a document and apply a template. (e.g., pdf, html, blog, hyperlinks)
	07.04 Format content to a document by applying font, paragraph attributes, indent and tab settings to text and paragraphs.
	07.05 Apply spacing settings to text and paragraphs.
	07.06 Navigate and search through a document, create and manipulate tables.
	07.07 Apply page layout and reusable content by editing and manipulating page setup settings and applying themes.
	07.08 Create and manipulate page backgrounds, headers and footers.
	07.09 Use image design theory and software to create illustrations, shapes, and graphics and include a selection in a document.
	07.10 Insert and format pictures, shapes, and clipart.
	07.11 Apply and manipulate text boxes.
	07.12 Proofread documents by validating content through the use of spell and grammar check.
	07.13 Configure autocorrect settings, insert and modify comments in a document.
	07.14 Apply references and hyperlinks, create end and footnotes, and create a table of contents in a document.
	07.15 Perform various mail merge options, macros and tracking revisions
08.0	Demonstrate knowledge and skill in using technology to enhance communication skills utilizing presentation applications. – The student will be able to:

CTE Standards and Benchmarks	
08.01	Manage and configure the presentation software environment, including: adjusting views, manipulating window, configuring toolbar and file options.
08.02	Create slide presentations utilizing various project development elements, including: adding and removing slides, slide layouts, format slide design, insert or format placeholders.
08.03	Locate, create and incorporate graphical and multimedia elements, including: shapes, graphics, images, bullets, hyperlinks, video, and audio into a slide presentation appropriate for the project.
08.04	Explore and apply design and color theory to create dynamic and appealing visuals.
08.05	Create and manipulate graphical and multimedia elements to improve or develop new contacts appropriate for the project, including: creation of images, color selections, tone, hue and contrast.
08.06	Demonstrate various business-related elements that can be created, embedded and manipulated in a slide presentation, including: charts, graphs, tables, spreadsheets, flowcharts, and organizational charts.
08.07	Apply slide transitions and create custom animations to slide presentations appropriate for the target audience.
08.08	Demonstrate different delivery methods for slide presentations, including: packaging for CD delivery, video projection – on mouse click, rehearsed timings, printing options - outlines, handouts, slides and notes.
09.0	Demonstrate knowledge and skill in using technology to enhance the effectiveness of communication utilizing spreadsheet and database applications. – The student will be able to:
09.01	Manage the worksheet environment by navigating through and printing a worksheet.
09.02	Personalize the environment by manipulating the ribbon tabs, group settings, importing data/database, manipulating properties, files and folders.
09.03	Create cell data, apply auto fill and hyperlinks.
09.04	Format cells and worksheets by applying cell formats, merging and splitting cells, create row and column titles, hide and unhide column titles, rows and columns.
09.05	Manipulate page set up options.
09.06	Create and apply cell styles.
09.07	Manage worksheets and workbooks by creating and formatting worksheets and manipulating views/themes.
09.08	Apply formulas and functions by creating formulas, enforcing precedence and cell formula references.
09.09	Apply conditional formula logic, name and cell ranges.
09.10	Demonstrate data visually by creating and modifying charts and images. (e.g., pivot tables)
09.11	Share worksheet data through email, changing file type and different versions. (e.g., mail merge)
09.12	Analyze and organize data through filters, sorting and applying conditional formatting. (e.g., macros)
09.13	Create different forms for inputting data into a database application.
09.14	Interpret queries for specialized reports using a database application.
09.15	Interpret data on line graphs, pie charts, diagrams, and tables commonly used in spreadsheet software applications that incorporate industry data.

CTE Standards and Benchmarks	
10.0	Demonstrate knowledge and skill in using technology to enhance communication skills utilizing electronic mail. – The student will be able to:
10.01	Describe and perform e-mail capabilities and functions.
10.02	Create and send messages, manage signature and automated messages.
10.03	Save, send, schedule, and manage junk mail, e-mail and spam.
10.04	Configure message sensitivity, security and delivery options.
10.05	Use the Internet to perform e-mail activities, including: attaching external files, saving e-mail attachments, viewing mailbox details, establishing appointments, creating contact groups, and sending a meeting to a contact group to communicate in the workplace.
10.06	Manage tasks and organize information. (e.g., forward e-mail)
11.0	Demonstrate proficiency using computer networks, internet, and online databases to facilitate collaborative communication. – The student will be able to:
11.01	Demonstrate how to connect to the Internet and use appropriate Internet protocol.
11.02	Identify and describe web terminology, addresses and how browsers work.
11.03	Demonstrate proficiency using basic features of GUI browsers, including: bookmarks, basic configurations, e-mail configurations, and address books.
11.04	Describe appropriate browser security configurations.
11.05	Describe information technology terminology, including Internet, intranet, ethics, copyright laws, and regulatory control.
11.06	Demonstrate proficiency using search engines and search tools.
11.07	Use various web tools, including: downloading files, transfer of files, telnet, PDF, plug-ins, and data compression.
11.08	Identify and use Boolean search strategies.
11.09	Understand and apply level one Universal Resource Locator (URL) and associated protocols (e.g., .com, .org, .edu, .gov, .net, etc.)
11.10	Explain the need for web-based applications. (dangers of piracy, copyright, plagiarism)
11.11	Describe appropriate use of social networking sites and applications, blogs and collaborative tools for file sharing and using listservers.
11.12	Describe web applications, including sharing photos and video clips, messaging, chatting and collaborating.
12.0	Develop an awareness of emerging technologies. – The student will be able to:
12.01	Compare and contrast emerging technologies and describe how they impact business in the global marketplace. (e.g., wireless, wireless web, cell phones, portables/handhelds, smart appliances, home networks, peer-to-peer)
13.0	Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals. – The student will be able to:
13.01	Analyze personal skills and aptitudes in comparison with various business related job and career options.

CTE Standards and Benchmarks	
13.02	Use career resources to develop an information base that reflects local and global business related occupations and opportunities for continuing education and workplace experience.
13.03	Demonstrate job-seeking skills required for entry-level employment, including resume, cover letter, thank you letter, online/hard copy application, mock interview, and follow-up call.
13.04	Design, initiate, refine and implement a plan to facilitate growth and skill development related to anticipated job requirements and career expectations.
13.05	Demonstrate an awareness of specific job requirements and career paths (e.g., requirements, characteristics needed) in business environments.
13.06	Demonstrate an awareness of the potential impact of local and global trends on career plans and life goals.
13.07	Describe the importance of building community and mentor relationships in a variety of professional and workplace situations.
13.08	Simulate work-based projects in an information technology environment.
14.0	Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance. – The student will be able to:
14.01	Demonstrate awareness of the following workplace essentials: Quality customer service; business ethics; confidentiality of information; copyright violations; accepted workplace rules, regulations, policies, procedures, processes, and workplace safety, and appropriate attire and grooming.
14.02	Demonstrate ways of accepting constructive criticism on team projects within the workplace.
14.03	Apply appropriate strategies to manage and resolve conflicts in work situations.
14.04	Demonstrate human relations, personal and interpersonal skills appropriate for the workplace, including: responsibility, dependability, punctuality, integrity, positive attitude, initiative, respect for self and others, and professional dress.

Florida Department of Education
Student Performance Standards

Course Number: TRA0182
Occupational Completion Point: C
Shipping, Receiving and Traffic Clerk – 150 Hours – SOC Code 43-5071

Course Description:
The Shipping, Receiving and Traffic Clerk course is designed to build on the skills and knowledge students learned in the Packer and the Materials Handler courses for entry into the logistics and supply chain industry. Students explore career opportunities and requirements of a professional logistician. Content emphasizes an understanding of warehouse operations, storage and control operations, protection, and economics.

CTE Standards and Benchmarks	
15.0	Demonstrate an understanding of warehouse operations--The student will be able to:
15.01	Identify and discuss the characteristics, purpose and importance of warehouse operations and supply chain management.
15.02	Define material handling logistics as it applies to the warehousing function.
15.03	Describe procedures for using computerized warehouse data.
15.04	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.
15.05	Define "logical" in terms of the term logistics.
15.06	Define movement in a warehouse and identify the various locations within the warehouse where planned efficient movement of materials takes place.
15.07	Explain channels of distribution.
15.08	Discuss safety regulatory requirements and procedures.
15.09	Explain the importance of storage in a warehouse.
15.10	Define control as it applies to warehousing.
15.11	Explain the relationship between physical structure and protection.
15.12	Identify various types of equipment available to enhance the efficient movement of materials within a warehouse.
15.13	Identify the various types of loading docks and cross docking.
15.14	Define the term "peaks and valleys" as it applies to warehouse activity.
15.15	Explain the importance of staging and JIT.
15.16	Identify the primary types of hand-operated pieces of warehouse equipment.

CTE Standards and Benchmarks	
15.17	Identify the important characteristics of industrial trucks.
15.18	Explain the concept of "balancing" as it applies to counterbalanced lift trucks.
15.19	Define the term narrow aisle as it applies to fork trucks.
15.20	Identify warehouse documents (e.g., pick tickets, special orders, inventory forms).
15.21	Display and interpret inventory screens, receive, inspect, and stock inventory.
15.22	Apply basic computer systems operations.
16.0	Demonstrate an understanding of storage and control operations--The student will be able to:
16.01	Explain the concepts involved in determining the best method for storage and the equipment needed to facilitate a cost effective and efficient warehouse.
16.02	Identify the factors that are involved with the calculating and estimating of the storage area needed for retention of materials in a warehouse.
16.03	Identify the possibilities and combinations of systems and equipment that can be used for storage areas in a warehouse.
16.04	Define the following storage related terms: Size, Volume, Density, Pallet, and Case.
16.05	Define the terms packaging, SKU, stacking frame, term "Logistics Execution Systems" (LES), signage and signposting, "real time" and barcoding.
16.06	Explain how the volume of materials, space usage, and control affect the design of storage space in a warehouse design.
16.07	Explain inventories and their importance.
16.08	Identify and analyze various warehouse storage systems.
16.09	Identify the two key issues in planning block stacking.
16.10	Identify the basic configuration for pallet rack.
16.11	Explain the concept of control in the broadest possible context and the importance of keeping track of materials and goods.
16.12	Identify the various types of technologies developed over the years to keep track of goods within the warehouse.
16.13	Identify various labeling and packaging schemes available for securing and tracking the movement of items through a warehouse.
16.14	Define the components of an LES.
16.15	Explain the importance of addresses in signage.
16.16	Define information-filled labeling.
16.17	Identify key magnetic devices used in automatic data capture.
16.18	Define radio frequency identification (RFID).
16.19	Explain the importance of automation in warehousing.

CTE Standards and Benchmarks	
	16.20 Identify the value of emerging technologies related to warehouse operations.
17.0	Demonstrate an understanding of protection skills--The student will be able to:
	17.01 Identify the role that protection plays in the total concept of "warehousing".
	17.02 Identify the various forms of unit load formation equipment that is used for protecting materials.
	17.03 Identify the types of load containment materials which include the machinery that dispenses them.
	17.04 Situations where they are most advantageously used.
	17.05 Explain the following: the need and means for protecting warehouse personnel and materials as they go about their duties.
	17.06 Identify the advantages and disadvantages of open-air or soft-wall warehousing for protection of warehoused items.
	17.07 Compliance issues.
18.0	Demonstrate economics--The student will be able to:
	18.01 Demonstrate understanding of goals, resources and structure of an organization.
	18.02 Understand the concepts and contributions of entrepreneurship.
	18.03 Compare and contrast the advantages and disadvantages of the various forms of business ownership.
	18.04 Understand economic principles affecting business cycles and the workforce.
	18.05 Analyze possible solutions to specific business problems.
	18.06 Apply economic decisions related to personal financial affairs, the successful operation of organizations and within a global economy.
	18.07 Understand the role of a consumer, producer, saver and investor in the market system.
	18.08 Understand the concepts and laws pertaining to customs and free trade.

Florida Department of Education
Student Performance Standards

Course Number: TRA0183
Occupational Completion Point: D
Logistics Technician – 150 Hours – SOC Code 13-1081

Course Description:
The Logistics Technician course is designed to build on the skills and knowledge students learned in the Packer, Materials Handler, and Shipping, Receiving and Traffic Clerk courses for entry into the logistics and supply chain industry. Students explore career opportunities and requirements of a professional logistician. Content emphasizes knowledge, skills, and understanding of college and career readiness, employability skills, career acquisition and retention, life skills, and technological literacy.

CTE Standards and Benchmarks	
19.0	Demonstrate an understanding of career readiness--The student will be able to:
19.01	Explain the importance of life-long learning.
19.02	Evaluate/research occupational interests.
19.03	Demonstrate attitudes/ethics needed for career success.
19.04	Assess personal strengths, talents, values and interests to appropriate jobs and careers to maximize career potential.
19.05	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.
19.06	Evaluate postsecondary training opportunities related to career interests, including certification, licensing, apprenticeships, college and military options.
19.07	Relate and identify career interests and transferable skills necessary for opportunities in the global workforce.
19.08	Develop an individual career plan and portfolio.
19.09	Analyze needs of business and industry on labor and economic trends.
19.10	Describe the changing roles including non-traditional occupations in the workplace.
20.0	Demonstrate employability skills--The student will be able to:
20.01	Identify and utilize resources used in a job search (e.g., newspaper, Internet, networking).
20.02	Discuss importance of drug tests and criminal background checks in identifying possible employment options.
20.03	Identify steps in the job application process including arranging for references and proper documentation.
20.04	Identify procedures and complete documents required when applying for a job (e.g., application, W-4, I-9).

CTE Standards and Benchmarks	
	20.05 Prepare a resume (electronic and traditional), cover letter, letter of application, follow-up letter, acceptance/rejection letter, and letter of resignation.
	20.06 Demonstrate appropriate dress and grooming for employment.
	20.07 Demonstrate effective interviewing skills (e.g., behavioral).
	20.08 Describe methods for handling illegal interview and application questions.
	20.09 Discuss state and federal labor laws regulating the workplace (e.g., Child Labor Law, sexual harassment, EEOC, ADA, FMLA).
	20.10 Identify positive work attitudes and behaviors such as honesty, compassion, respect, responsibility, fairness, trustworthiness, and caring.
	20.11 Describe importance of producing quality work and meeting performance standards.
	20.12 Identify personal and business ethics (e.g., preventing theft, pilfering, and unauthorized discounting).
	20.13 Demonstrate orderly and systematic behavior by creating and maintaining a personal planner.
	20.14 Identify qualities typically required for promotion (e.g., productivity, dependability, responsibility).
	20.15 Identify how to prepare for job separation and re-employment.
	20.16 Create and maintain a career portfolio (e.g., resume, letters of recommendation, awards, evidence of participation in school/community/volunteer activities, employer evaluations).
21.0	Demonstrate competencies in a specific career--The student will able to:
	21.01 Demonstrate job performance skills as outlined in the training plan
	21.02 Exhibit effective workplace safety practices including use of protective devices
	21.03 Display an acceptable level of productivity and quality control
	21.04 Demonstrate effective written and oral communication and listening skills when interacting with customers, co-workers, and managers
	21.05 Demonstrate decision making and problem solving processes and techniques used in the workplace.
	21.06 Demonstrate acceptable work habits and conduct in the workplace as defined by company policy
	21.07 Demonstrate an understanding of the company's vision and mission statements.
	21.08 Demonstrate an understanding of the company's goals and objectives
	21.09 Demonstrate familiarity with the company's products and services
	21.10 Demonstrate the ability to identify authority, rights, and responsibilities of both employers and employees
22.0	Demonstrate career acquisition--The student will be able to:
	22.01 Participate in work-based learning opportunities such as: mentoring, cooperative work, job shadows, apprenticeships and internships.

CTE Standards and Benchmarks	
	22.02 Demonstrate effective oral and written communication skills necessary for employment.
	22.03 Demonstrate job search skills using a variety of resources.
	22.04 Apply the decision-making process to the various stages of the work life cycle.
	22.05 Identify and demonstrate employability skills including job search, selection, the interviewing process, proper dress and presentation.
	22.06 Compare and contrast compensation packages that include varying levels of wages and benefits.
23.0	Demonstrate career retention--The student will be able to:
	23.01 Demonstrate positive personal qualities and self-management skills (i.e. time management, organization, punctuality and attendance).
	23.02 Describe how productivity, work ethic and quality affect job stability.
	23.03 Demonstrate communication team-building and leadership skills.
	23.04 Demonstrate personal health and workplace safety procedures.
	23.05 Identify biases, harassment and discriminatory behaviors impacting job success and advancement.
	23.06 Acknowledge and respond to constructive criticism and employment evaluation.
	23.07 Understand the importance of following company policy and procedures and the legal ramifications of labor laws impacting employment.
	23.08 Understand the role of compromise in conflict resolution.
24.0	Demonstrate integrated learning and life skills--The student will be able to:
	24.01 Demonstrate the integration and application of academic and occupational skills in school, work and personal lives.
	24.02 Use communication, mathematical and technical skills to compare compute, and analyze complex information.
	24.03 Discuss how personal choices, experiences, technology, education/training and other factors correlate with earning a living.
	24.04 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.
	24.05 Compare and contract strategies for personal finance and risk management.
	24.06 Demonstrate the ability to set, monitor and achieve clearly defined goals.
25.0	Demonstrate technology and information--The students will be able to:
	25.01 Apply knowledge of technology to identify and solve problems.
	25.02 Identify and evaluate how information technology developments have changed the way people work.
	25.03 Select, apply and troubleshoot software and hardware as they apply to a variety of work applications.
	25.04 Describe how new developments in varied fields or technology affect the job market and the level of worker‘s responsibilities.

CTE Standards and Benchmarks	
25.05	Analyze the ethical issues surrounding access, privacy and confidentiality of information in emerging technologies.
25.06	Explore current and future positions and career paths in field of technology.
25.07	Identify job tasks that presently are and will be in the future performed in the specified occupation (training plan).
25.08	Create a training plan indicating competencies mastered.
25.09	Maintain a record of employment hours and wages for auditing and budgetary purposes (e.g., time cards, budget sheets).
25.10	Maintain an up-to-date, signed training agreement.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

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 – Career Preparatory	
Program Number	T400100
CIP Number	0647060303
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	AUTO IND @7 %7G AUTO BODY @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3021 – Automotive Body and Related Repairers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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 ARR0213	Paint and Body Helper Paint and Body Assistant	250 hours 250 hours	49-3021
B	ARR0020	Auto Collision Estimator	100 hours	49-3021
C	ARR0313	Frame and Body Repairman	150 hours	49-3021

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Automotive Collision Repair and Refinishing program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate vehicle and industry knowledge, business management, and shop and occupational safety skills.
02.0 Prepare vehicles for repair and refinishing by applying creative techniques.
03.0 Creatively repair, replace and adjust outer body panels.
04.0 Perform welding operations that apply creativity and interpretation.
05.0 Evaluate and prepare surfaces for refinishing.
06.0 Select and apply appropriate polishing compounds and detail techniques.
07.0 Setup vehicle for measuring and pulling.
08.0 Calculate, measure and repair unibody vehicles.
09.0 Inspect and creatively repair frame type vehicle bodies.

Florida Department of Education
Student Performance Standards

Program Title: **Automotive Collision Repair and Refinishing 1**
PSAV Number: **T400100**

Course Number: ARR0210
Occupational Completion Point: A (1 of 2)
Paint and Body Helper – 250 Hours – SOC Code 49-3021

Course Description:
The Paint and Body Helper course prepares students for entry into the Automotive Collision and Repair industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study vehicle and industry knowledge, business management, occupational safety, vehicle preparation, and outer body panels.

CTE Standards and Benchmarks	
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 by applying creative techniques--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.

CTE Standards and Benchmarks	
	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	Creatively 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.

Course Number: ARR0213
Occupational Completion Point: A (2 of 2)
Paint and Body Assistant – 250 Hours – SOC Code 49-3021

Course Description:
The Paint and Body Assistant course is designed to build on the skills and knowledge students learned in the Paint and Body Helper course for entry into the Automotive Collision and Repair industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study welding operations, surface evaluation and preparation, polishing and detail techniques.

CTE Standards and Benchmarks	
04.0	Perform welding operations that apply creativity and interpretation--The student will be able to:
	04.01 Demonstrate welding safety procedures.
05.0	Evaluate and 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.

CTE Standards and Benchmarks	
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.
06.0	Select and apply appropriate polishing compounds and detail techniques--The student will be able to:
06.01	Sand, buff and polish finishes.
06.02	Clean and detail a vehicle after completion of refinishing.

Florida Department of Education
Student Performance Standards

Course Number: ARR0020
Occupational Completion Point: B
Auto Collision Estimator – 100 Hours – SOC Code 49-3021

Course Description:
The Auto Collision Estimator course is designed to build on the skills and knowledge students learned in the Paint and Body Assistant course for entry into the Automotive Collision and Repair industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study industry knowledge, business management, occupational safety, and vehicle preparation.

CTE Standards and Benchmarks	
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 by applying creative techniques--The student will be able to:
02.09	Use specification and crash manuals including "P" pages.

Florida Department of Education
Student Performance Standards

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

Course Description:
The Frame and Body Repairman course is designed to build on the skills and knowledge students learned in the Auto Collision Estimator course for entry into the Automotive Collision and Repair industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study industry knowledge, business management, occupational safety, outer body panel adjustment, measuring, pulling, unibody vehicle repair, and frame repair.

CTE Standards and Benchmarks	
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	Creatively 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.
07.0	Setup vehicle for measuring and pulling--The student will be able to:
07.01	Determine and plan methods and order of repair.
07.02	Mount vehicle on anchoring equipment.
07.03	Measure vehicle damage using manufacturers' specifications.
07.04	Attach pulling equipment, pull and re-measure.
08.0	Calculate, measure and repair unibody vehicles--The student will be able to:
08.01	Precisely measure unibody vehicles.
08.02	Diagnose and measure unibody damage using self-centering and tram gauges.
08.03	Diagnose and measure unibody damage using a datum plane.
08.04	Determine the location of all suspension, steering and power train component attaching point to the body.
08.05	Clean, prime and apply protective coat to repaired unibody structural areas.
08.06	Determine the extent of the direct and indirect damage and the direction of impact and plan the method and order of repair.
08.07	Precisely measure unibody vehicles, check and adjust suspension mount points that effect four-wheel alignment.

CTE Standards and Benchmarks	
08.08	Diagnose and measure unibody damage using a dedicated (fixture) measuring system.
08.09	Diagnose and measure unibody damage using a universal measuring system or a laser.
08.10	Attach proper body anchoring devices.
08.11	Identify procedures to straighten and align cowl assemblies.
08.12	Identify procedures to straighten and align roof pillars and roof panels.
08.13	Identify procedures to straighten and align doorposts, sills, floor pans and rocker panels.
08.14	Identify procedures to straighten and align quarter panels, wheel-housing assemblies and rear body sections (including rail, suspension and power train panels).
08.15	Identify procedures to straighten/align front-end sections (aprons, strut towers, upper/lower rails, steering, suspension and power train mounting points).
08.16	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.
08.17	Use proper cold stress relief methods.
08.18	Remove folds, curves, creases and dents using power tools and hand tools to restore damaged areas to proper contours and dimensions.
08.19	Determine the extent of damage to structural steel body panels and repair, weld or replace them in accordance with manufacturers' specifications.
08.20	Determine the extent of damage to structural aluminum body panels in accordance with manufacturers' specifications.
08.21	Cut out damaged sections of structural steel body panels and weld in new and/or used replacement in accordance with accepted industry standards.
08.22	Recheck panel contour and alignment after pulling and correct or adjust as necessary.
09.0	Inspect and creatively repair frame type vehicle bodies--The student will be able to:
09.01	Diagnose and measure frame damage using self-centering and tram gauge.
09.02	Determine the extent of direct and indirect damage and the direction of impact and plan methods and order of repairs.
09.03	Clean, prime and protective coat repaired frame areas.
09.04	Identify procedures to straighten and align mash damage.
09.05	Identify procedures to straighten and align sag damage.
09.06	Identify procedures to straighten and align side sway damage.
09.07	Identify procedures to straighten and align twist damage.
09.08	Identify procedures to straighten and align kickup damage.
09.09	Identify procedures to straighten and align broadside damage.

CTE Standards and Benchmarks	
09.10	Identify procedures to straighten and align diamond frame damage.
09.11	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.
09.12	Repair, reinforce or replace weakened frame members in accordance with vehicle manufacturers' recommendations.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

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 – Career Preparatory	
Program Number	T400200
CIP Number	0647060304
Grade Level	30, 31
Standard Length	650 hours
Teacher Certification	AUTO IND @7 %7G AUTO BODY @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3021 – Automotive Body and Related Repairers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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	ARR0127	Automotive Refinishing	325 hours	49-3021
B	ARR0240	Automobile Body Repairer	325 hours	49-3021

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Automotive Collision Repair and Refinishing program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate vehicle and industry knowledge, business management, and shop and occupational safety skills.
02.0 Prepare vehicles for repair and refinishing by applying creative techniques.
03.0 Creatively repair, replace and adjust outer body panels.
04.0 Perform welding operations that apply creativity and interpretation.
05.0 Evaluate and prepare surfaces for refinishing.
06.0 Select and apply appropriate polishing compounds and detail techniques.
07.0 Maintain and operate spray equipment.
08.0 Finish defects, causes and cures.
09.0 Prepare metal parts and panels for creative finishing.
10.0 Prepare and apply body fillers.
11.0 Perform miscellaneous repairs.
12.0 Repair fiberglass and plastic components.

Florida Department of Education
Student Performance Standards

Course Number: ARR0127
Occupational Completion Point: A
Automotive Refinishing – 325 Hours – SOC Code 49-3021

Course Description:
The Automotive Refinishing course is designed to build on the skills and knowledge students learned in the Frame and Body Repairman course for entry into the Automotive Collision and Repair industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study industry knowledge, business management, occupational safety, surface evaluation and preparation, polishing, detail techniques, spray equipment, and finishing.

CTE Standards and Benchmarks	
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	Evaluate and 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 safely remove paint finishes.
05.03	Dry and wet sand areas to be refinished.
05.04	Artistically 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	Creatively 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 polishing compounds and detail techniques--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	Interpret the type and color of paint already on a vehicle and identify alternates.
06.03	Measure, shake, stir, thin or reduce, and strain paint.

CTE Standards and Benchmarks	
06.04	Verify color match before applying and adjust if needed.
06.05	Creatively apply urethane enamel for spot, panel and overall refinishing.
06.06	Creatively apply urethane clear coat for spot, panel and overall repairs.
06.07	Apply decals, transfers, tapes, wood-grains, pinstripes (painted and taped), etc.
06.08	Properly dispose of hazardous waste.
06.09	Identify the types of plastic parts to be finished and determine the proper refinishing procedure.
06.10	Apply a finish coat to plastic parts.
06.11	Clean, condition and refinish vinyl (e.g. upholstery, dashes and tops).
06.12	Apply a tri-coat paint system using visual and artistic techniques.
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	Appropriately use creative and artistic 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 and interpret 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, interpret and 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.

CTE Standards and Benchmarks
08.11 Identify pin holing; correct the condition.

Florida Department of Education
Student Performance Standards

Course Number: ARR0240
Occupational Completion Point: B
Automobile Body Repairer – 325 Hours – SOC Code 49-3021

Course Description:
The Automobile Body Repairer course is designed to build on the skills and knowledge students learned in the Automotive Refinishing course for entry into the Automotive Collision and Repair industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study repair and refinishing techniques, outer body panel adjustment, welding operations, metal preparation, body fillers, miscellaneous repair techniques, fiberglass, and plastics.

CTE Standards and Benchmarks	
02.0	Prepare vehicles for repair and refinishing by applying creative techniques--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	Creatively 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 that apply creativity and interpretation--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	Creatively perform various welds with MIG equipment including plug, butt and lap.
04.04	Setup and maintain oxyacetylene welding equipment.

CTE Standards and Benchmarks	
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 creative 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	Creatively apply plastic body filler and cheese grate during curing.
10.03	Block sand cured plastic body fillers to creatively and artistically 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.

CTE Standards and Benchmarks	
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 creative repair procedures (including plastic welding, chemical bonding and the use of structural adhesives).
12.02	Creatively 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.

Additional Information

Laboratory Activities

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

Special Notes

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 demonstrates 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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Marine Service Technologies**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T400210
CIP Number	0647061611
Grade Level	30,31
Standard Length	1350
Teacher Certification	DIESEL MECH @7 7G GASENG RPR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051 – Motorboat Mechanics and Service Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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 hours	49-3051
B	MTE0090	Outboard Engine Technician	300 hours	49-3051
C	MTE0074	Outboard Engine Diagnostics Technician	150 hours	49-3051
D	MTE0092	Inboard Gas Engine Technician	300 hours	49-3051
E	MTE0093	Drive Train Technician	150 hours	49-3051
F	MTE0056	Inboard Diesel Technician	150 hours	49-3051

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate an understanding of workplace safety and workplace organization.
02.0 Adjust and repair trailers.
03.0 Use marine woods, metals, and fiberglass.
04.0 Maintain and repair basic two-stroke cycle outboard engines.
05.0 Maintain and repair fuel systems on boats.
06.0 Maintain and repair electrical systems.
07.0 Prepare delivery checklist.
08.0 Maintain and repair outboard capacitor discharge ignition systems.
09.0 Maintain and repair outboard fuel systems.
10.0 Parts specialist and computer skills to industry standards.
11.0 Maintain and repair basic four-stroke cycle outboard engines.
12.0 Maintain and repair outboard charging systems.
13.0 Maintain and repair outboard battery ignition systems.
14.0 Maintain and repair outboard cranking systems.
15.0 Maintain and repair outboard lubrication systems.
16.0 Maintain and repair outboard cooling systems.
17.0 Maintain and repair outboard lower gear cases.
18.0 Assemble and maintain outboard lower units and housing assemblies.
19.0 Demonstrate employability skills.
20.0 Demonstrate an understanding of entrepreneurship.
21.0 Apply basic computer skills.
22.0 Troubleshoot and solve problems with outboard engines using industry recognized computer-based diagnostic equipment.
23.0 Set up electric and digital control box, and gauges.
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 battery ignition systems.
29.0 Maintain and repair capacitor discharge ignition systems.
30.0 Maintain and repair stern drive upper gear cases.
31.0 Maintain and repair stern drive lower gear cases.
32.0 Maintain and repair stern drive intermediate housing.
33.0 Maintain and repair inboard gas transmissions.
34.0 Maintain and repair inboard diesel fuel systems.
35.0 Maintain and repair inboard diesel cooling systems.
36.0 Maintain and repair inboard diesel lubrication systems.
37.0 Maintain and repair inboard diesel charging systems.

Florida Department of Education
Student Performance Standards

Program Title: **Marine Service Technologies**
PSAV Number: **T400210**

Course Number: MTE0003
Occupational Completion Point: A
Marine Rigger – 300 Hours – SOC Code 49-3051

Course Description:
Students will learn entry-level skills for the outboard marine service industry. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of workplace safety and organization, trailer service, various boat materials, 2-stroke cycle outboard engines, fuel systems on boats, marine electrical systems, procedures for preparing boats to customers, capacitor discharge ignition systems, outboard engine fuel systems, and proper use of computer systems related to parts specialization.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of workplace safety and workplace organization--The student will be able to:
01.01	Identify safety requirements for manual, electrical-powered, and pneumatic tools.
01.02	Demonstrate, apply, and provide evidence of safely using manual, electrical-powered, and pneumatic tools.
01.03	Identify safety requirements for operation of automated machines and equipment.
01.04	Demonstrate, apply, and provide evidence of safely operating automated machines and equipment.
01.05	Set up and use precision measurement tools.
01.06	Drill and remove broken studs and install helicoils.
01.07	Identify threaded fasteners by size, type, thread series, thread classes, material hardness and compatibility.
01.08	Demonstrate appropriate heating techniques and skills.
01.09	Read, interpret, and apply service manuals.
01.10	Identify the safe use of paints, chemicals, fiberglass, and compounds
01.11	Demonstrate, apply, and provide evidence of safely using paints, chemicals, fiberglass, and compounds.
01.12	Identify the safe use of electrical connectors and cords.
01.13	Demonstrate, apply, and provide evidence of safely using electrical connectors and cords.
01.14	Identify, demonstrate, apply, and provide evidence of understanding of shop safety rules on an ongoing basis.
01.15	Research and identify class A, B, and C type fires.

CTE Standards and Benchmarks	
01.16	Demonstrate and apply the proper procedures for extinguishing class A, B, and C type fires.
01.17	Identify various workplace injuries related to the marine industry.
01.18	Demonstrate and practice knowledge of first aid and first response procedures appropriate for this course.
01.19	Identify and apply safety procedures in case of smoke or chemical inhalation.
01.20	Demonstrate and apply material handling techniques to safely move materials.
01.21	Demonstrate and apply proper techniques for lifting loads.
01.22	Research and identify Occupational Safety Health Administration (OSHA) safety standards related to the marine industry.
01.23	Demonstrate, apply, and provide evidence of understanding Occupational Safety Health Administration (OSHA) safety standards related to the marine industry.
01.24	Demonstrate knowledge of safety requirements for material handling equipment such as rigging, ladders, and scaffolds related to the marine industry.
01.25	Demonstrate knowledge of National Institute of Occupational Safety and Health (NIOSH), Environmental Protection Agency (EPA) and other regulatory agencies recommendations, guidelines and best practices.
01.26	Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
01.27	Locate Material Safety Data Sheets (MSDS).
01.28	Demonstrate understanding and knowledge of using and applying the information located on Material Safety Data Sheets (MSDS).
01.29	Proactively respond to a safety concern and then document occurrences.
01.30	Identify and report unsafe conditions.
01.31	Determine the appropriate corrective action after an unsafe condition is identified.
01.32	Demonstrate knowledge of various emergency alarms and procedures.
01.33	Demonstrate knowledge and apply clean-up procedures for spills.
01.34	Identify and apply procedures for handling hazardous material.
01.35	Perform safety and environmental inspections.
01.36	Perform leak checks to determine if toxic or hazardous material is escaping from a piece of equipment.
01.37	Demonstrate knowledge of proper and safe installation techniques as described in manuals, checklists, and regulations.
01.38	Demonstrate and apply proper equipment shutdown procedures.
01.39	Identify, select, and use personal protective equipment (PPE).
01.40	Identify, demonstrate, and apply ergonomic work techniques.
01.41	Train other students to use and apply safety skills outlined in this standard.

CTE Standards and Benchmarks	
02.0	Adjust and repair trailers--The student will be able to:
02.01	Make boat to trailer adjustments.
02.02	Remove and replace lighting systems.
02.03	Remove, inspect, repack, and replace wheel bearings and springs.
02.04	Remove and replace brakes.
02.05	Check lug nuts on trailer for correct torque.
03.0	Use marine woods, metals, and fiberglass--The student will be able to:
03.01	Explain the hazards of a marine environment to woods, metals and fiberglass.
03.02	Explain a galvanic series.
03.03	Explain the theory for using given materials in boat repair activities.
04.0	Maintain and repair basic two-stroke cycle outboard engines--The student will be able to:
04.01	Explain the basic principles of the operation of two-stroke cycle internal combustion engines.
04.02	Identify types of two-stroke cycle engines.
04.03	Locate engine serial and model numbers.
04.04	Identify engine assemblies and systems.
04.05	Disassemble engines.
04.06	Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
04.07	Diagnose head problems by use of the visual inspection method.
04.08	Diagnose head problems by use of the compression tester method.
04.09	Diagnose head problems by use of the stethoscope method.
04.10	Remove, clean and inspect piston rods and assemblies.
04.11	Measure out-of-round of pistons and cylinders.
04.12	Hone cylinders.
04.13	Check the total bearing surface of connecting rod bearings.
04.14	Measure piston skirts and ring grooves.
04.15	Measure the piston ring gap in cylinder bores.
04.16	Install piston pins according to manufacturer's specifications.

CTE Standards and Benchmarks	
04.17	Check rod and piston assembly alignment.
04.18	Install rings on pistons.
04.19	Install piston rod assemblies.
04.20	Measure and check crankshafts with a micrometer.
04.21	Check needle bearings.
04.22	Inspect crankshafts and install seal.
04.23	Inspect, clean and/or replace reed valves.
04.24	Reassemble engines.
05.0	Maintain and repair fuel systems on boats--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	Describe or demonstrate the process for removing, cleaning, inspecting and installing fuel tanks.
05.05	Locate and identify fuel pumps and test the vacuum and pressure.
05.06	Determine and make appropriate fuel oil mixtures.
06.0	Maintain and repair electrical systems--The student will be able to:
06.01	Locate and match electrical units by their symbols on a wiring diagram.
06.02	Set up and use voltmeters, ammeters and ohmmeters.
06.03	Locate and identify electrical circuit components.
06.04	Sketch a typical circuit using a single wire system.
06.05	Test storage batteries using proper industry recognized battery testing equipment.
06.06	Charge storage batteries.
06.07	Remove and replace batteries and service battery boxes.
06.08	Repair damaged wire and electrical harnesses.
06.09	Diagnose circuit troubles using continuity or a test light and low reading voltmeters to record voltage drop.
06.10	Sketch and label typical fuel gage systems.
06.11	Remove and replace ammeters or indicating lights.

CTE Standards and Benchmarks	
06.12	Remove and replace fuel gages.
06.13	Remove and replace fuel-sending units.
06.14	Diagnose gages and accessory system troubles using voltmeters, ammeters or detached sending units.
06.15	Sketch typical circuits such as those for auto bilge pumps or navigation lights.
06.16	Locate opens, shorts and grounds.
06.17	Demonstrate proficiency in applying industry standard wire terminal practices.
06.18	Demonstrate proper installation of 2 position and 3 position battery switches.
06.19	Demonstrate correct procedure for connecting batteries in series and parallel.
06.20	Check alternator output voltage with engine running compare with specifications.
07.0	Prepare delivery checklist--The student will be able to:
07.01	Make center line measurements for outboard motor installation.
07.02	Locate manufacturers' I.D. plates.
07.03	Mount control boxes at the helm.
07.04	Place wiring and cables in a neat and orderly manner.
07.05	Adjust the control cables from the engine to the control box.
07.06	Center the steering cable to the engine.
07.07	Find suitable locations for accessories and mount them to the boat.
07.08	Lubricate shafts, install propellers and fasten both securely.
07.09	Check for proper levels.
07.10	Check manufacturers' specifications.
07.11	Describe how to or test-run boats.
07.12	Recheck work completed.
07.13	Check manufacturers' installation procedures for stern drive units.
07.14	Lubricate shafts and install propellers securely.
07.15	Demonstrate proper procedures for checking oil level capacity.
07.16	Install or connect drain plugs, petcocks, hose clamps, hoses, etc.
07.17	Remove and replace running lights.

CTE Standards and Benchmarks	
07.18	Troubleshoot lighting systems and accessories.
07.19	Check and adjust throttles, cables, horns, lights and tachometers.
07.20	Check steering system for proper operation.
08.0	Maintain and repair outboard capacitor discharge ignition systems--The student will be able to:
08.01	Sketch and label electrical symbols.
08.02	Set up and use ohmmeters.
08.03	Set up and use a DVA tester or equivalent.
08.04	Set up and use spark testers.
08.05	Set up and use neon test lights.
08.06	Set up and use low/high ammeters.
08.07	Set up and use voltmeters.
08.08	Locate and identify parts of capacitor discharge ignition systems.
08.09	Locate and match electrical units by their symbols on a wiring diagram.
08.10	Sketch and label complete C/D ignition systems.
08.11	Check coil resistance, shorts and grounds with an ohmmeter.
08.12	Check stator windings with an ohmmeter.
08.13	Check sensor coils, charge coils, ignition coils and shorts to ground with a DVA tester or equivalent.
08.14	Check power packs with an ohmmeter and a DVA tester or equivalent.
09.0	Maintain and repair outboard fuel systems--The student will be able to:
09.01	Identify the major types of carburetors.
09.02	Check and adjust throttle.
09.03	Identify and service different types of EFI systems.
09.04	Remove, service, and replace air cleaners.
09.05	Identify basic carburetor circuits (chokes, floats, fuel inlets; idle, intermediate and high speeds; mains, etc.)
09.06	Diagnose carburetor problems.
09.07	Remove, clean, overhaul, replace and make final adjustments to carburetors.
09.08	Diagnose exhaust problems such as back pressure and scavenging.

CTE Standards and Benchmarks	
	09.09 Remove, service, and replace flame arrestors.
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 Demonstrate knowledge of different parts and accessories.

Florida Department of Education
Student Performance Standards

Course Number: MTE0090
Occupational Completion Point: B
Outboard Engine Technician – 300 Hours – SOC Code 49-3051

Course Description:
Students will learn entry-level skills for the outboard marine service industry. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of outboard 4-stroke cycle engines, charging systems, battery ignition systems, cranking systems, lubrication systems, cooling systems, lower gear cases, lower units and housing assemblies, employability, and entrepreneurship.

CTE Standards and Benchmarks	
11.0	Maintain and repair basic four-stroke cycle outboard engines--The student will be able to:
11.01	Explain the basic principles of the operation of four-stroke cycle internal combustion engines.
11.02	Identify types of four-stroke cycle engines.
11.03	Locate engine serial and model numbers.
11.04	Identify engine assemblies and systems.
11.05	Diagnose valve and head problems by use of the visual inspection method.
11.06	Diagnose valve and head problems by use of the compression tester method.
11.07	Disassemble engines and inspect parts.
11.08	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
11.09	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
11.10	Adjust valves.
11.11	Remove and inspect camshafts and lifters.
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.

CTE Standards and Benchmarks	
	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.
	11.29 Inspect/replace timing belt/chain.
12.0	Maintain and repair outboard charging systems--The student will be able to:
	12.01 Sketch and label the units of complete charging circuits.
	12.02 Disassemble charging systems and identify the components.
	12.03 Perform stator and rectifier testing on charging systems.
	12.04 Reassemble and test charging systems.
	12.05 Set up and use ohmmeters.
	12.06 Reassemble and test complete units.
13.0	Maintain and repair outboard battery ignition systems--The student will be able to:
	13.01 Locate and identify parts of battery ignition systems.
	13.02 Locate and match electrical units by their symbols on a wiring diagram.
	13.03 Sketch and label complete battery ignition systems.
	13.04 Check coil resistance with an ohmmeter.
	13.05 Set up and use test equipment.
	13.06 Set timing using timing light.
	13.07 Clean and regap spark plugs.
14.0	Maintain and repair outboard cranking systems--The student will be able to:
	14.01 Disassemble recoil starters.

CTE Standards and Benchmarks	
	14.02 Inspect components of recoil starters.
	14.03 Reassemble recoil starters.
	14.04 Identify components of electrical starting systems.
	14.05 Bench test switches.
	14.06 Troubleshoot starting systems using multimeter.
	14.07 Locate opens, short and grounds.
15.0	Maintain and repair outboard lubrication systems--The student will be able to:
	15.01 Identify the types and functions of lubrication systems.
	15.02 Explain the principles of lubrication systems.
	15.03 Identify and locate components of lubrication systems.
	15.04 Check engines for oil leaks.
	15.05 Change engine oil and filters.
	15.06 Check engine oil pressure and level.
	15.07 Recognize and use only recommended oil.
	15.08 Inspect and service oil metering systems.
16.0	Maintain and repair outboard cooling systems--The student will be able to:
	16.01 Explain the principles of cooling systems.
	16.02 Trace water flow through cooling systems.
	16.03 Disassemble, examine for problems and reassemble water pumps.
	16.04 Remove, check and replace thermostats.
	16.05 Service poppet valves.
	16.06 Service or replace thermostat and thermostat housings.
17.0	Maintain and repair outboard lower gear cases--The student will be able to:
	17.01 Remove and replace lower gear cases.
	17.02 Identify the components of lower gear case.
	17.03 Refill lower gear cases with specified oil.
	17.04 Determine propeller pitch diameter and hub type.
18.0	Assemble and maintain outboard lower units and housing assemblies--The student will be able to:
	18.01 Disassemble and reassemble steering handle groups.

CTE Standards and Benchmarks	
18.02	Disassemble and assemble exhaust housings and water tube assemblies.
18.03	Replace motor mounts and shock absorbers.
18.04	Lubricate all fittings.
18.05	Pressure and vacuum test gear cases.
18.06	Remove and service cylinders and rams.
18.07	Adjust the trim and tilt.
18.08	Determine the differences between mechanical, electrical and hydraulic shifting units.
18.09	Explain the shifting theory of the lower unit.
18.10	Perform correct procedure for filling trim and tilt with hydraulic oil.
19.0	Demonstrate employability skills--The student will be able to:
19.01	Conduct a job search using periodicals and the internet.
19.02	Secure information about a job.
19.03	Identify documents that may be required when applying for a job interview.
19.04	Complete a job application form correctly.
19.05	Demonstrate competence in job interview techniques.
19.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
19.07	Identify acceptable work habits.
19.08	Demonstrate knowledge of how to make appropriate job changes.
19.09	Demonstrate acceptable employee health habits.
19.10	Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200).
20.0	Demonstrate an understanding of entrepreneurship--The student will be able to:
20.01	Define entrepreneurship.
20.02	Describe the importance of entrepreneurship to the American economy.
20.03	List the advantages and disadvantages of business ownership.
20.04	Identify and explain the risks involved in ownership of a business.
20.05	Identify and explain the necessary personal characteristics of a successful entrepreneur.
20.06	Identify and explain the business skills needed to operate a small business efficiently and effectively.
20.07	Identify and explain the various types of business structures, e.g. sole proprietor, S-Corporation, etc.

Florida Department of Education
Student Performance Standards

Course Number: MTE0074
Occupational Completion Point: C
Outboard Engine Diagnostics Technician – 150 Hours – SOC Code 49-3051

Course Description:
Students will learn entry-level skills for the outboard marine service industry. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of basic computer skills, computer-based diagnostic equipment, electrical, control box, and gauges.

CTE Standards and Benchmarks	
21.0	Apply basic computer skills--The student will be able to:
21.01	Identify and apply the proper procedures for turning on, and turning off a computer.
21.02	Identify and apply the proper procedures for logging on, and logging off a computer.
21.03	Demonstrate knowledge of properly using and navigating operating systems.
21.04	Identify and properly use various peripheral devices. (e.g., printers, scanners, external storage devices)
21.05	Demonstrate and apply the process for locating, copying, pasting, saving, and backing up a file and folder
21.06	Demonstrate the process for opening and saving a file using program specific extensions. (e.g., .docx, .pdf, .txt)
21.07	Identify and apply the proper procedures for securely uploading and downloading files over external and internal networks.
21.08	Demonstrate the proper procedures for using and navigating e-mail programs.
21.09	Create and send electronic messages using proper e-mail communication etiquette.
21.10	Show understanding for properly attaching a file within an e-mail message.
22.0	Troubleshoot and solve problems with outboard engines using industry recognized computer-based diagnostic equipment--The student will be able to:
22.01	Demonstrate and understand the proper procedures for connecting diagnostic equipment to an outboard engine.
22.02	Identify and demonstrate the proper procedures for opening and closing diagnostic programs.
22.03	Use multiple research techniques to identify faults and data to be used to solve outboard engine trouble.
22.04	Formulate a plan to repair outboard engines given the data found.
22.05	Download, save, and print output data from an outboard engine.
23.0	Set up electric and digital control box, and gauges--The student will be able to:

CTE Standards and Benchmarks
23.01 Assign position to outboard engines.
23.02 Set up trim and tilt limits.
23.03 Set up digital gauges.

Florida Department of Education
Student Performance Standards

Course Number: MTE0092
Occupational Completion Point: D
Inboard Gas Engine Technician – 300 Hours – SOC Code 49-3051

Course Description:
Students will learn skills for the inboard marine service industry. Hands-on training combined with laboratory and classroom experiences gives the student an understanding of basic four-stroke cycle engines, fuel systems, cooling systems, lubrication systems, ignition systems, and capacitor discharge ignition systems.

CTE Standards and Benchmarks	
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	Disassemble engines and inspect parts.
24.04	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
24.05	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
24.06	Adjust valves.
24.07	Remove and inspect camshafts and lifters.
24.08	Clean and inspect lifters for wear.
24.09	Time valve drive assemblies.
24.10	Remove pistons from rod assemblies.
24.11	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
24.12	Check piston pins and bosses for wear.
24.13	Measure piston ring lands width, out-of-round and taper.
24.14	Measure the piston ring gap in cylinder bores.
24.15	Install and fit piston pins.
24.16	Check rod and piston assembly alignment.
24.17	Remove and replace rod bearings.

CTE Standards and Benchmarks	
	24.18 Hone and clean cylinders.
	24.19 Install rings on pistons.
	24.20 Measure and check crankshafts with a micrometer.
	24.21 Check for end play.
	24.22 Check bearing bores with a telescoping gage.
	24.23 Reassemble engines.
	24.24 Install oil seals.
	24.25 Inspect/replace timing belt/chain.
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 Describe or demonstrate the process for removing, cleaning, inspecting and installing fuel tanks.
	25.05 Vacuum test fuel system.
	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 linkages.
	25.10 Identify and service different types of EFI systems.
	25.11 Identify and understand different types of Vapor Separator Tank (VST) systems.
	25.12 Remove, service, and replace flame arrestors.
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 Check thermostat pressure relief systems.

CTE Standards and Benchmarks	
	26.06 Service manifolds, risers and thermostat housings.
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 battery ignition systems--The student will be able to:
	28.01 Locate and match electrical units by their symbols on a wiring diagram.
	28.02 Sketch and label complete battery ignition systems.
	28.03 Set up and use test equipment.
	28.04 Set timing using a timing light
29.0	Maintain and repair capacitor discharge ignition systems--The student will be able to:
	29.01 Sketch and label electrical symbols.
	29.02 Set up and use ohmmeters.
	29.03 Set up and use appropriate test equipment.
	29.04 Set up and use spark testers.
	29.05 Set up and use neon test lights.
	29.06 Set up and use low/high ammeters.
	29.07 Set up and use voltmeters.
	29.08 Locate and identify parts of capacitor discharge ignition systems.
	29.09 Locate and match electrical units by their symbols on a wiring diagram.
	29.10 Check coil resistance, shorts and grounds with an ohmmeter.
	29.11 Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment.

Florida Department of Education
Student Performance Standards

Course Number: MTE0093
Occupational Completion Point: E
Drive Train Technician – 150 Hours – SOC Code 49-3051

Course Description:
Students will learn entry-level skills for the outboard marine service industry. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of stern drive upper and lower cases, intermediate housings, and inboard gas transmissions.

CTE Standards and Benchmarks	
30.0	Maintain and repair stern drive upper gear case--The student will be able to:
30.01	Identify components of upper gear case.
30.02	Use the proper oil to refill upper and lower gear cases.
31.0	Maintain and repair stern drive lower gear cases--The student will be able to:
31.01	Identify components of lower gear case.
31.02	Remove and replace lower gear cases.
31.03	Refill lower gear cases with specified oil.
31.04	Determine propeller pitch, diameter and hub type.
32.0	Maintain and repair stern drive intermediate housings--The student will be able to:
32.01	Check engine alignment.
32.02	Check electrical components with proper test equipment.
32.03	Remove and replace "U" joints.
32.04	Identify components of transom plates.
32.05	Service, install, and adjust trim and tilt systems.
33.0	Maintain and repair inboard gas transmissions--The student will be able to:
33.01	Remove and replace transmissions.
33.02	Drain transmissions.
33.03	Determine capacity using the transmission service manuals.
33.04	Refill transmissions according to manufacturers' specifications.

Florida Department of Education
Student Performance Standards

Course Number: MTE0056
Occupational Completion Point: F
Inboard Diesel Technician – 150 Hours – SOC Code 49-3051

Course Description:
Students will learn entry-level skills for the diesel marine service industry. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of diesel fuel, cooling, lubrication, and charging systems.

CTE Standards and Benchmarks	
34.0	Maintain and repair inboard diesel fuel systems--The student will be able to:
34.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
34.02	Sketch and label the parts of total fuel systems.
34.03	Service fuel lines.
34.04	Describe or demonstrate the process for removing, cleaning, inspecting and installing fuel tanks.
34.05	Identify and locate fuel control devices.
34.06	Remove, clean and replace in-line filters.
34.07	Check and adjust throttle and governor linkages.
34.08	Check fuel systems for leaks.
34.09	Bleed systems for starting.
34.10	Set the injection pump angle (timing).
34.11	Check or replace glow plugs.
34.12	Check; stop solenoids.
35.0	Maintain and repair inboard diesel cooling systems--The student will be able to:
35.01	Disassemble and reassemble water pumps.
35.02	Remove, check and replace thermostats.
35.03	Use thermostat pressure relief systems.
35.04	Service manifolds, risers and thermostat housings.
35.05	Service water-cooling systems for diesel engines.

CTE Standards and Benchmarks	
36.0	Maintain and repair inboard diesel lubrication systems--The student will be able to:
36.01	Identify the types and functions of lubrication systems.
36.02	Explain the principles of lubrication systems.
36.03	Identify and locate components of lubrication systems.
36.04	Check engines for oil leaks.
36.05	Change engine oil and filters.
36.06	Check engine oil pressure and level.
36.07	Recognize and use only recommended oil.
37.0	Maintain and repair inboard diesel charging systems--The student will be able to:
37.01	Inspect, remove and replace alternator belts.
37.02	Check the output of charging systems.
37.03	Analyze malfunctions.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	T400300
CIP Number	0647060902
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	AVIONICS @7 7G ELECTRONIC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2091 – Avionics Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

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 as avionics installation and repair technicians.

The course 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.

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.

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

Program Structure

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

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	AVS0095	Basic Electronics Troubleshooter	150 hours	49-2091
B	AVS0096	Advanced Electronics Troubleshooter	150 hours	49-2091
C	AVS0097	Avionics Installation Technician	150 hours	49-2091
D	AVS0098	Avionics Technician	150 hours	49-2091

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Avionics Technology program can be found using the following links:

www.faa.gov/
http://www.eta-i.org/

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate proficiency in soldering and basic laboratory practices.
02.0 Demonstrate proficiency in basic DC circuits.
03.0 Demonstrate employability skills.
04.0 Demonstrate an understanding of entrepreneurship.
05.0 Demonstrate proficiency in knowledge of basic computer usage.
06.0 Demonstrate proficiency in advanced DC circuits.
07.0 Demonstrate proficiency in AC circuits.
08.0 Demonstrate proficiency in analog circuits.
09.0 Demonstrate proficiency in solid state devices.
10.0 Demonstrate proficiency in digital circuits.
11.0 Demonstrate proficiency in fundamental micro-processors.
12.0 Demonstrate appropriate understanding of basic math skills.
13.0 Demonstrate an understanding of basic science skills.
14.0 Demonstrate skills in technical recording.
15.0 Demonstrate appropriate communication skills.
16.0 Demonstrate competency in adherence to Federal Aviation Regulations including FAA form 337 and FAR 43.13.
17.0 Demonstrate proficiency with Aircraft Drawings CAD and wiring diagrams.
18.0 Demonstrate proficiency in Aircraft fundamentals.
19.0 Demonstrate proficiency in aircraft electrical systems and ground safety.
20.0 Demonstrate proficiency in installing avionics systems, including, Comm, Nav, GPS, Traffic Avoidance, audio integrating etc.
21.0 Demonstrate proficiency in sheet metal applications.
22.0 Demonstrate proficiency in AM and FM transmitters.
23.0 Demonstrate proficiency in AM and FM receivers.
24.0 Demonstrate proficiency in AM and FM transceivers.
25.0 Demonstrate proficiency in electromagnetic wave emissions.
26.0 Demonstrate proficiency in line maintenance of airborne radio navigation systems and equipment.
27.0 Demonstrate proficiency in line maintenance of airborne communication systems.
28.0 Demonstrate proficiency in primary and secondary airborne radar systems.
29.0 Demonstrate proficiency with In-Flight Entertainment Systems.
30.0 Demonstrate proficiency with Engine Monitoring displays, purpose and function.
31.0 Pitot-Static Systems
32.0 Foundations
33.0 UAS Development
34.0 UAV Flight Operations
35.0 UAS Operations

Florida Department of Education
Student Performance Standards

Program Title: **Avionics Technology**
PSAV Number: **T400300**

Course Number: AVS0095
Occupational Completion Point: A
Basic Electronics Troubleshooter – 150 Hours – SOC Code 49-2091

Course Description:
The Basic Electronics Troubleshooter course prepares students for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study basic laboratory practices, direct current (DC), employability, entrepreneurship, computer literacy, advanced direct current (DC), and alternating current (AC).

CTE Standards and Benchmarks	
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 DC 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.

CTE Standards and Benchmarks	
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	Analyze and troubleshoot series circuits.
02.11	Apply Ohm's law to parallel circuits.
02.12	Analyze and troubleshoot parallel circuits.
03.0	Demonstrate employability skills--The student will be able to:
03.01	Discuss elements of a job search.
03.02	Develop sources of information about a job.
03.03	Identify documents that may be required when applying for a job.
03.04	Complete a job application form correctly.
03.05	Demonstrate competence in job interview techniques.
03.06	Identify or demonstrate appropriate responses to criticism from employer, supervisor or other persons.
03.07	Identify acceptable work habits.
03.08	Demonstrate knowledge of how to make appropriate job changes.
03.09	Demonstrate acceptable employee health habits.
03.10	Demonstrate knowledge of the “Right-to-Know Law” as recorded in (29 CFR-1910.1200).
03.11	Resume writing
04.0	Demonstrate an understanding of entrepreneurship--The student will be able to:
04.01	Define entrepreneurship.
04.02	Describe the importance of entrepreneurship to the American economy.
04.03	List the advantages and disadvantages of business ownership.
04.04	Identify the risks involved in ownership of a business.
04.05	Identify the necessary personal characteristics of a successful entrepreneur.
04.06	Identify the business skills needed to operate a small business efficiently and effectively.
04.07	Corporate structure “S”,”C”, Sole Proprietor, “LLC”

CTE Standards and Benchmarks	
05.0	Demonstrate proficiency in knowledge of basic computer usage--The student will be able to:
05.01	Demonstrate proficiency in the knowledge of basic computer use.
05.02	Demonstrate the use of computer application programs (i.e., word processing, data base, Excel).
06.0	Demonstrate proficiency in advanced DC 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	Describe magnetic properties of circuits and devices.
06.10	Determine the physical and electrical characteristics of capacitors and inductors.
06.11	Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants
06.12	Set up and operate power supplies for DC circuits.
07.0	Demonstrate proficiency in AC 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	Analyze and troubleshoot AC capacitive circuits.
07.04	Define the characteristics of AC inductive circuits.
07.05	Analyze and troubleshoot AC inductive circuits.
07.06	Define and apply the principles of transformers to AC circuits.
07.07	Analyze and troubleshoot AC circuits utilizing transformers.
07.08	Analyze and troubleshoot differentiator and integrator circuits.
07.09	Define the characteristics of resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).
07.10	Define the characteristics of series and parallel resonant circuits.

CTE Standards and Benchmarks
07.11 Analyze and troubleshoot R-C, R-L, and RLC circuits.
07.12 Define the characteristics of frequency selective filter circuits.
07.13 Analyze and troubleshoot frequency selective filter circuits.
07.14 Define the characteristics of polyphase circuits.
07.15 Define basic motor theory and operation.
07.16 Define basic generator theory and operation.
07.17 Set up and operate power supplies for AC circuits.
07.18 Analyze and measure power in AC circuits.

Florida Department of Education
Student Performance Standards

Course Number: AVS0096
Occupational Completion Point: B
Advanced Electronics Troubleshooter– 150 Hours – SOC Code 49-2091

Course Description:
The Advanced Electronics Troubleshooter course prepares students for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study analog circuitry, solid state devices, digital circuitry, micro-processors, math, science, technical recording, communication skills, FAA and FAR regulations, aircraft CAD and wiring diagrams, and aircraft fundamentals.

CTE Standards and Benchmarks	
08.0	Demonstrate proficiency in analog circuits--The student will be able to:
08.01	Identify and define operational characteristics and applications of multistage amplifiers.
08.02	Analyze and troubleshoot multistage amplifiers.
08.03	Identify and define operating characteristics and applications of linear integrated circuits.
08.04	Identify and define operating characteristics and applications of basic power supplies and filters.
08.05	Identify and define operating characteristics and applications of differential and operational amplifiers.
08.06	Analyze and troubleshoot differential and operational amplifier circuits.
08.07	Identify and define operating characteristics of audio power amplifiers.
08.08	Analyze and troubleshoot audio power amplifiers.
08.09	Identify and define operating characteristics and applications of power supply regulator circuits.
08.10	Analyze and troubleshoot power supply regulator circuits.
08.11	Identify and define operating characteristics and applications of active filters.
08.12	Analyze and troubleshoot active filter circuits.
08.13	Identify and define operating characteristics and applications of sinusoidal and non-sinusoidal oscillator circuits.
08.14	Analyze and troubleshoot oscillator circuits.
08.15	Identify and define operating characteristics and applications of cathode ray tubes.
08.16	Identify and define operating characteristics and applications of optoelectronic devices.
08.17	Set up and operate measuring instruments for analog circuits.

CTE Standards and Benchmarks	
09.0	Demonstrate proficiency in solid state devices--The student will be able to:
09.01	Identify and define properties of semiconductor materials.
09.02	Identify and define operating characteristics and applications of junction diodes.
09.03	Identify and define operating characteristics and applications of special diodes.
09.04	Analyze and troubleshoot diode circuits.
09.05	Identify and define operating characteristics and applications of bipolar transistors,
09.06	Identify and define operating characteristics and applications of field effect transistors.
09.07	Identify and define operating characteristics and applications of single-stage amplifiers.
09.08	Analyze and troubleshoot single-stage amplifiers.
09.09	Analyze and troubleshoot thyristor circuitry.
09.10	Set up and operate DVM for solid-state devices.
09.11	Set up and operate power supplies for solid-state devices.
09.12	Set up and operate oscilloscopes for solid-state devices.
09.13	Set up and operate function generators for solid-state devices.
09.14	Demonstrate transistor testing techniques.
10.0	Demonstrate proficiency in digital circuits--The student will be able to:
10.01	Define and apply numbering systems to codes and arithmetic operations.
10.02	Analyze and minimize logic circuits using Boolean operations.
10.03	Set up and operate logic probes for digital circuits.
10.04	Set up and operate power supplies for digital circuits and solve power distribution and noise problems.
10.05	Set up and operate pulsers for digital circuits.
10.06	Set up and operate oscilloscopes for digital circuits.
10.07	Set up and operate logic analyzers for digital circuits.
10.08	Set up and operate pulse generators for digital circuits.
10.09	Identify types of logic gates and their truth tables.
10.10	Construct combinational logic circuits using integrated circuits.
10.11	Troubleshoot logic circuits.

CTE Standards and Benchmarks	
10.12	Analyze types of flip-flops and their truth tables.
10.13	Troubleshoot flip-flops.
10.14	Identify, define and measure characteristics of integrated circuit (IC) logic families.
10.15	Identify types of registers and counters.
10.16	Troubleshoot registers and counters.
10.17	Analyze clock and timing circuits.
10.18	Troubleshoot clock and timing circuits.
10.19	Identify types of arithmetic-logic circuits.
10.20	Troubleshoot arithmetic-logic circuits.
10.21	Identify types of encoding and decoding devices.
10.22	Troubleshoot encoders and decoders.
10.23	Identify types of multiplexer and demultiplexer circuits.
10.24	Troubleshoot multiplexer and demultiplexer circuits.
10.25	Identify types of memory circuits.
10.26	Relate the uses of digital-to-analog and analog-to-digital conversions.
10.27	Troubleshoot digital-to-analog and analog-to-digital circuits.
10.28	Identify types of digital displays.
10.29	Troubleshoot digital display circuits.
11.0	Demonstrate proficiency in fundamental micro processors--The student will be able to:
11.01	Identify central processing unit (CPU) building blocks and their uses (architecture).
11.02	Analyze bus concepts.
11.03	Analyze various memory schemes.
11.04	Use memory devices in circuits.
11.05	Set up and operate oscilloscopes for microprocessor systems.
11.06	Identify types of input and output devices and peripherals.
11.07	Interface input and output ports to peripherals.
11.08	Analyze and troubleshoot input and output ports.

CTE Standards and Benchmarks	
12.0	Demonstrate appropriate understanding of basic 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 containing a minimum of six items.
12.05	Demonstrate and understanding of federal, state, and local taxes and their computation.
13.0	Demonstrate an understanding of basic science skills--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 interferences 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 skills in technical recording--The student will be able to:
14.01	Draw and interpret electronic schematics.
14.02	Write reports and make oral presentations.
14.03	Maintain test logs.
14.04	Make equipment failure reports.
14.05	Specify and requisition simple electronic components.
14.06	Compose technical letters and memoranda.
14.07	Write formal reports of laboratory experiences.
14.08	Draft preventive maintenance 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 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.

CTE Standards and Benchmarks	
16.0	Demonstrate competency in adherence to federal aviation regulations--The student will be able to:
16.01	Maintenance Technician-General Privileges and Limitations.
16.02	Maintenance Forms and Records including FAA Form 337.
16.03	Maintenance Publications.
16.04	Use and analysis of technical data.
17.0	Demonstrate proficiency with aircraft drawings--The student will be able to:
17.01	Aircraft Drawings and Diagrams, Flowcharts, Symbols, and Lines
17.02	Reading and interpreting Aircraft Drawings and Blueprints
17.03	Preparation and sketches of repairs and alterations
17.04	Use of charts and graphs
17.05	Familiarization and usage of CAD Systems
18.0	Demonstrate proficiency in aircraft fundamentals--The student will be able to:
18.01	Aerodynamic Forces and Aircraft Structures and Components
18.02	Aircraft Flight Controls and Aircraft Flight Operations.

Florida Department of Education
Student Performance Standards

Course Number: AVS0097
Occupational Completion Point: C
Avionics Installation Technician – 150 Hours – SOC Code 49-2091

Course Description:
The Avionics Installation Technician course prepares students for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study electrical systems, grounding safety, avionics systems, sheet metal applications, AM and FM transmitters, receivers, transceivers, electromagnetic wave emissions, and airborne radio navigation systems.

CTE Standards and Benchmarks	
19.0	Demonstrate proficiency in aircraft electrical systems and ground safety--The student will be able to:
19.01	Circuit Protective Devices, Switches, Lamps, and Relays.
19.02	Safety and Handling of Aircraft Electrical Wires and Cables.
19.03	Cutting, Stripping, Splicing, Soldering, and Stamping/Identifying Wires and Cables for Installation in an Aircraft.
19.04	Preparation, Use, Installation, and Inspection of General Purpose Connectors.
19.05	AN-MS Connectors for Aircraft Electrical Systems
19.06	Lead-Acid and Nickel Cadmium (NiCad) Aircraft Batteries-Identification, Construction, Installation and Service.
19.07	Familiarization with Aircraft Alternator and Generator Systems.
20.0	Demonstrate proficiency in installing avionics systems--The student will be able to:
20.01	Installation Planning
20.02	Design wiring interconnection for Comm, Nav, GPS, Traffic Avoidance, Audio Integrating etc.
20.03	Fabricate Wiring Harnesses
20.04	Corrosion Control in Avionics
20.05	Mechanical Installation
20.06	Electrical Installation
20.07	Installation of Manufacturers Equipment
20.08	Antenna Placement and Noise interference
21.0	Demonstrate proficiency in sheet metal applications--The student will be able to:

CTE Standards and Benchmarks	
	21.01 Selection, Installation, and Removal of Conventional Rivets
	21.02 Selection, Installation, and Removal of Special Rivets (Fasteners)
	21.03 Layout, Forming, and Bending Sheet Metal
	21.04 Inspecting and Repairing Sheet Metal Structures
	21.05 Aircraft Antenna Installations and Doubler plates.
22.0	Demonstrate proficiency in AM and FM transmitters--The student will be able to:
	22.01 Define DSB, SSB and FM modulation.
	22.02 Analyze and troubleshoot AM and FM RF oscillator circuits.
	22.03 Analyze and troubleshoot buffer and multiplier circuits.
	22.04 Analyze and troubleshoot RF power amplifier circuits.
	22.05 Analyze and troubleshoot AM and FM modulation circuits.
	22.06 Analyze and troubleshoot microphone circuits.
	22.07 Analyze and troubleshoot balanced modulators and SSB filter circuits.
	22.08 Analyze and troubleshoot AM and FM power supply circuits.
	22.09 Make power, frequency and modulation measurements of AM and FM transmitters.
	22.10 Align and troubleshoot AM and FM transmitters.
	22.11 Describe FCC rules pertaining to AM and FM transmitter maintenance and operation.
23.0	Demonstrate proficiency in AM and FM receivers--The student will be able to:
	23.01 Analyze and troubleshoot receiver audio voltage and power amplifiers and speaker/headphone circuits.
	23.02 Analyze and troubleshoot AM and FM detector circuits.
	23.03 Analyze and troubleshoot AM IF amplifier circuits.
	23.04 Analyze and troubleshoot FM IF amplifier and limited circuits.
	23.05 Analyze and troubleshoot receiver oscillator and AFC circuits.
	23.06 Analyze and troubleshoot RF mixer/heterodyne circuits.
	23.07 Analyze and troubleshoot receiver RF amplifier circuits.
	23.08 Analyze and troubleshoot AVC/AGC circuits.
	23.09 Analyze and troubleshoot receiver power supplies.

CTE Standards and Benchmarks	
	23.10 Align and troubleshoot AM and FM receivers.
24.0	Demonstrate proficiency in AM and FM transceivers--The student will be able to:
	24.01 Analyze and troubleshoot transceiver control, metering and switching circuits.
	24.02 Analyze and troubleshoot transceiver frequency synthesizers and phase locked loop circuits.
	24.03 Analyze and troubleshoot squelch circuits.
	24.04 Align and troubleshoot transceivers.
25.0	Demonstrate proficiency in electromagnetic wave emissions--The student will be able to:
	25.01 Define the radio frequency spectrum.
	25.02 Define types and classification of RF emissions.
	25.03 Define the characteristics of radio waves.
	25.04 Define radio wave propagation method.
	25.05 Define the basic types of antennas.
	25.06 Draw the voltage and current relationships and radiation patterns for the basic types of antennas.
	25.07 Define methods for antenna tuning, gain and directivity.
	25.08 Define transmission lines in terms of electrical and physical properties.
	25.09 Define standing waves, cause and effect, and measure standing wave ratios.
	25.10 Define tuned transmission lines and describe applications.
	25.11 Construct transmission lines.
	25.12 Define waveguides, resonant cavities and their applications.

Florida Department of Education
Student Performance Standards

Course Number: AVS0098
Occupational Completion Point: D
Avionics Technician – 150 Hours – SOC Code 49-2091

Course Description:
The Avionic Technician course prepares students for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study airborne communication systems, primary and secondary airborne radar systems, In-Flight entertainment systems, engine monitoring systems, Pitot-Static systems, Foundations, UAS Development, UAV Flight, and UAS Operations.

CTE Standards and Benchmarks	
26.0	Demonstrate proficiency in line maintenance of airborne radio navigation systems and equipment--The student will be proficient in theory and operating principles of:
26.01	Global Position Satellite System
26.02	Earth Coordinate System
26.03	Great Circle Navigation
26.04	Navigation Principles
26.05	VHF Omni Range System
26.06	Distance Measuring Equipment System
26.07	Automatic Direction Finder System
26.08	Instrument Landing System
26.09	Microwave Landing Systems.
26.10	Electrical integration including
a.	Airborne Instrument System
b.	VHF Omni-directional range/instrument Landing System (ILS) and System Localizer (VOR/LOC) audio
c.	Navigation Indicators (CDI ON/OFF flag, TO/FROM flag, OBS, etc.)
d.	Radio Magnetic Indicator (RMI)
e.	Flight Director (FD) System
f.	Autopilot (AP) System
26.11	Flight Management System

CTE Standards and Benchmarks	
27.0	Demonstrate proficiency in line maintenance of airborne communication systems--The student will be able to:
	27.01 History of the Radio
	27.02 Regulatory and non-Regulatory Agencies affecting aircraft electronic systems
	27.03 Aircraft Audio Integration Systems
	27.04 VHF Communication Systems
	27.05 HF Communication Systems
	27.06 Satellite Communication Systems
	27.07 Selective Calling
	27.08 Aircraft Communication Automatic Reporting System
28.0	Demonstrate proficiency in primary and secondary radar systems--The student will be proficient in theory and operating principles of:
	28.01 Primary Radar Theory of Operation
	28.02 Block Level Primary Function
	28.03 Doppler Radar
	28.04 Secondary (ATC) Radar Transponder
	28.05 Altitude Encoding
	28.06 Lightning Detection
	28.07 XM Weather System
29.0	Demonstrate proficiency with in-flight entertainment systems--The student will be familiar with similarity and difference of various systems.
	29.01 System familiarization, purpose, function
	29.02 Installation considerations
30.0	Engine monitoring displays–The student will be able to identify and interpret data from various types of displays.
	30.01 Display types
	30.02 Purpose, function, interpretation of data
31.0	Pitot-static systems--The students will be able to test and interpret results from practical run-ups.
	31.01 Understand purpose and function of pitot-static systems
	31.02 Ability to perform integrity run-up checks
	31.03 Troubleshoot pitot-static system

CTE Standards and Benchmarks	
INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS	
32.0	Foundations–The students will be able to explain the roles, requirements, and basic function of Unmanned Aerial Systems:
	32.01 Introduction to UAS
	32.02 UAS Certifications and Requirements.
	32.03 Aerodynamics
33.0	UAS Development–The students will demonstrate a working knowledge of the airframes and powerplants utilized in Unmanned Aerial Systems:
	33.01 Parts of an Airplane, Aircraft Performance.
	33.02 Structures and Fabrication, and Aircraft Components.
	33.03 Reliability, Availability, Maintainability.
34.0	UAV Flight Operations--The students will demonstrate an understanding of the levels of autonomy currently in use as well as those under development, as well as function and purpose of Unmanned Aerial Vehicles. They will also be exposed to employment possibilities inherent to UAV operation:
	34.01 UAV Guidance, Navigation and Control.
	34.02 UAV Payloads, Power, and Communications.
	34.03 UAS Personnel, Operations, and Careers.
35.0	UAS Operations--The students will be able to explain cost and risk factors associated with and alleviated by usage of Unmanned Aerial Systems:
	35.01 UAS Missions
	35.02 Ground Control Station Components, Flight Line Safety.
	35.03 History of UAS, Systems Engineering, Engineering Design Process.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Mobile Electronics Technology**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

NOTE: This program has been **daggered for deletion** with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, **no new students may be enrolled** in this program. Students already enrolled in the program may, at the District's discretion, continue taking courses in the program until completion.

PSAV – Career Preparatory	
Program Number	T400400
CIP Number	0647010105
Grade Level	30, 31
Standard Length	300 hours
Teacher Certification	COMP SVC 7G ELECTRONIC @7 7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2096 – Electronic Equipment Installers and Repairers, Motor Vehicles
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	N/A

Purpose

The purpose of this program is to prepare students for employment or advanced training in a variety of occupations in the Mobile Electronics technology industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Mobile Electronics Industry; technical skills, underlying principles of technology , planning, management, finance, 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. This program offers a broad foundation of knowledge and skills to prepare students for employment in network support services positions.

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

Program Structure

This program is a planned sequence of instruction consisting of two occupational completion points as follows: (A) Mobile Electronics Technician (B) Advanced Mobile Electronics Installation Technician. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training certifications. A student who completes the applicable competencies at any occupational completion point may either continue with the training or become an occupational completer.

The courses content includes, but is not limited to, installation, configuration, operation, and maintenance of Mobile Audio/Video Systems; Autosound, Wireless Communications, Security, Navigation, In-Vehicle Information Systems, Safety Systems, Satellite Antenna, and low voltage wiring systems. Content also includes preparation for industry-level certifications. Other course content includes, but is not limited to, communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

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

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

OCP	Course Number	Course Title	Course Length	SOC Code
A	EEV0714	Basic Mobile Electronics Technician	150 hours	49-2096
B	EEV0715	Advanced Mobile Electronics Installation Technician	150 hours	49-2096

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate proficiency in the assessment of vehicle electrical system condition.
02.0 Demonstrate proficiency in evaluating and assessing various circuits in a vehicle where aftermarket components will connect.
03.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive audio system elements, enhancements or the replacement of audio system components.
04.0 Demonstrate proficiency in the evaluation and installation of basic and advanced automotive security and convenience elements and components.
05.0 Demonstrate proficiency in the installation of Rear Seat Entertainment (RSE) Systems.
06.0 Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles.
07.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
08.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
09.0 Explain the importance of employability and entrepreneurship skills.
10.0 Demonstrate proficiency in occupational safety.
11.0 Demonstrate proficiency in appropriate math skills.
12.0 Demonstrate proficiency in appropriate understanding of basic sciences.
13.0 Demonstrate appropriate communication skills.
14.0 Demonstrate proficiency in electrical basics.
15.0 Demonstrate a working knowledge of direct current circuits.
16.0 Demonstrate a working knowledge of alternating current (AC) circuits.
17.0 Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles.
18.0 Demonstrate a working knowledge of dual trace oscilloscopes.
19.0 Demonstrate a working knowledge of electronically controlled charging system.
20.0 Demonstrate proficiency in acceptable employee behavior in the automotive industry.
21.0 Demonstrate a working knowledge of system diagnosis and repair
22.0 Demonstrate a working knowledge of vehicle electrical systems
23.0 Demonstrate a working knowledge of advanced installation knowledge and techniques.
24.0 Demonstrate a working knowledge of advanced mobile audio/video systems.
25.0 Demonstrate a working knowledge of advanced security and convenience systems.
26.0 Demonstrate a working knowledge of advanced in-vehicle information and control systems.

Florida Department of Education
Student Performance Standards

Program Title: **Mobile Electronics Technology**
PSAV Number: **T400400**

Course Number: EEV0714
Occupational Completion Point: A
Basic Mobile Electronics Technician – 150 Hours – SOC Code 49-2096

Course Description:
The Basic Mobile Electronics Technician 1 course content includes, but is not limited to, installation, configuration, operation, and maintenance of Mobile Audio/Video Systems; Autosound, Wireless Communications, Security, Navigation, In-Vehicle Information Systems, Safety Systems, Satellite Antenna, and low voltage wiring systems. Other course content includes, but is not limited to, communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

CTE Standards and Benchmarks	
01.0	Demonstrate proficiency in the assessment of vehicle electrical system condition--The student will be able to:
01.01	Identify vehicle electrical system components.
01.02	Evaluate the vehicle's current electrical system condition.
01.03	Identify faulty or weak components.
02.0	Demonstrate proficiency in evaluating and assessing various circuits in a vehicle where aftermarket components will connect--The student will be able to:
02.01	Evaluate the vehicle's ability to support aftermarket equipment, in particular audio amplifiers.
02.02	Determine electrical upgrades according electrical demands.
02.03	Evaluate ignition switch wiring and associated circuits.
02.04	Test all ignition switch circuits.
02.05	Determine the polarity and function of each wire connected to the ignition switch.
02.06	Evaluate headlight switch wiring and associated circuits.
02.07	Test all headlight switch circuits.
02.08	Determine the polarity and function of each wire connected to the headlight switch.
02.09	Evaluate the door lock/unlock switch wiring and associated circuits.
02.10	Test all door lock/unlock switch circuits.

CTE Standards and Benchmarks	
	02.11 Determine the polarity and function of each wire connected to the door lock/unlock switch.
	02.12 Evaluate the door pin switches wiring and associated circuits.
	02.13 Test all door pin switch circuits.
	02.14 Determine the polarity and function of each wire connected to the door pin switches and interior lights.
	02.15 Evaluate the trunk release switch wiring and associated circuits.
	02.16 Test the trunk release switch circuit.
	02.17 Determine the polarity and function of each wire connected to the trunk release switch.
	02.18 Evaluate the foot brake switch wiring and associated circuits.
	02.19 Test the foot brake switch circuit.
	02.20 Determine the polarity and function of each wire connected to the foot brake switch.
03.0	Demonstrate proficiency in the evaluation and installation of basic and advanced automotive audio system elements, enhancements or the replacement of audio system components--The student will be able to:
	03.01 Describe the components used in soldering.
	03.02 Perform Soldered connections.
	03.03 Determine if soldering is appropriate for a particular installation situation.
	03.04 Determine the physical characteristics of an aftermarket head unit.
	03.05 Determine what connections and installation accessories are required for a particular head unit replacement.
	03.06 Install an aftermarket head unit.
	03.07 Determine the physical characteristics of aftermarket speakers.
	03.08 Determine what connections and installation accessories are required for a particular set of replacement speakers.
	03.09 Install aftermarket speakers.
	03.10 Determine the physical characteristics of aftermarket amplifier.
	03.11 Determine what connections and installation accessories are required for a particular amplifier.
	03.12 Install an aftermarket amplifier.
	03.13 Connect multiple speakers to a single channel.
	03.14 Perform both series and parallel wiring configurations noting the electrical characteristics of each.
	03.15 Perform amplifier bridging to one speaker.
	03.16 Perform amplifier bridging to two speakers.

CTE Standards and Benchmarks	
	03.17 Install an aftermarket amplifier in an OEM system.
	03.18 Install and configure an aftermarket head unit in an OEM system.
	03.19 Install an aftermarket power antenna.
04.0	Demonstrate proficiency in the evaluation and installation of basic and advanced automotive security and convenience elements and components--The student will be able to:
	04.01 Determine the physical characteristics of an aftermarket security system.
	04.02 Determine what connections and installation accessories are required to interface a particular security system with the vehicle.
	04.03 Install, program and configure an aftermarket security system.
	04.04 Describe the characteristics and functions of various automotive relays and some of their common applications.
	04.05 Describe the characteristics and functions of various silicone diodes and some of their common applications.
	04.06 Describe situations when relays and diodes need to be added to an automotive security system.
	04.07 Install relays and diodes in an automotive security system.
	04.08 Determine the physical characteristics of a remote starter system.
	04.09 Determine what connections are required to interface a particular remote starter system with the vehicle.
	04.10 Install, program and configure a remote starter system.
05.0	Demonstrate proficiency in the installation of Rear Seat Entertainment (RSE) Systems--The student will be able to:
	05.01 Determine the physical characteristics of a standalone rear seat entertainment system.
	05.02 Determine what connections are required to interface a particular stand alone rear seat entertainment system with the vehicle.
	05.03 Install, program and configure a standalone rear seat entertainment system.
	05.04 Integrate the sound from the video system through the OEM audio system.
06.0	Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles--The student will be able to:
	06.01 Describe the overall effect of voltage drops and determine the points at which they can originate.
	06.02 Measure voltage drops between two points.
	06.03 Diagnose a voltage drop against a known good reference measurement.
	06.04 Evaluate short circuits and determine how they can originate.
	06.05 Locate and repair a short circuit between two points.
	06.06 Evaluate open circuits and determine how they can originate.
	06.07 Locate and repair an open circuit between two points.

CTE Standards and Benchmarks	
	06.08 Measure and evaluate critical components for proper functioning.
07.0	Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:
	07.01 Describe the nature and types of business organizations.
	07.02 Explain the effect of key organizational systems on performance and quality.
	07.03 List and describe quality control systems and/or practices common to the workplace.
	07.04 Explain the impact of the global economy on business organizations.
08.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:
	08.01 Employ leadership skills to accomplish organizational goals and objectives.
	08.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	08.03 Conduct and participate in meetings to accomplish work tasks.
	08.04 Employ mentoring skills to inspire and teach others.
09.0	Explain the importance of employability and entrepreneurship skills--The student will be able to:
	09.01 Identify and demonstrate positive work behaviors needed to be employable.
	09.02 Develop personal career plan that includes goals, objectives, and strategies.
	09.03 Examine licensing, certification, and industry credentialing requirements.
	09.04 Maintain a career portfolio to document knowledge, skills, and experience.
	09.05 Evaluate and compare employment opportunities that match career goals.
	09.06 Identify and exhibit traits for retaining employment.
	09.07 Identify opportunities and research requirements for career advancement.
	09.08 Research the benefits of ongoing professional development.
	09.09 Examine and describe entrepreneurship opportunities as a career planning option.
	09.10 Demonstrate knowledge of the “Right-To-Know Law” as recorded in (29 CFR-1910.1200).
	09.11 Read and understand manufacturer’s specification sheets, equipment installation instructions and equipment owner’s manuals.

Florida Department of Education
Student Performance Standards

Course Number: EEV0715
Occupational Completion Point: B
Advanced Installation Technician – 150 Hours – SOC Code 49-2096

Course Description:
The Advanced Installation Technician course content includes, but is not limited to, installation, configuration, operation, and maintenance of Mobile Audio/Video Systems; Autosound, Wireless Communications, Security, Navigation, In-Vehicle Information Systems, Safety Systems, Satellite Antenna, and low voltage wiring systems. Other course content includes, but is not limited to, communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

CTE Standards and Benchmarks	
10.0	Demonstrate proficiency in occupational safety--The student will be able to:
10.01	List the level of electricity (shock) considered lethal to humans.
10.02	Explain the purpose and reasons for adherence to NFPC codes.
10.03	Describe safety considerations when working in and around motor vehicles and vessels.
10.04	Apply shop safety rules, EPA and OSHA standards.
10.05	Identify and use appropriate emergency first aid procedures.
10.06	Identify, use and maintain hand and power tools properly.
10.07	Identify and practice using appropriate precision measuring tools and torque methods.
10.08	Identify and describe the proper procedure to apply and remove automotive fasteners, to include thread repair.
10.09	Identify and use metric and English measurement skills.
10.10	Use computer and operate keyboard.
10.11	Identify automobiles according to vehicle identification number (VIN)
10.12	Interpret the Florida “Workers Right-to-Know Law”.
10.13	Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
11.0	Demonstrate proficiency in appropriate math skills--The student will be able to:
11.01	Read and interpret measuring devices (rules and tapes).
11.02	Solve number word problems.

CTE Standards and Benchmarks	
11.03	Write percents add fractions and decimals.
11.04	Solve percent problems.
11.05	Find the percent of a number.
11.06	Operate a calculator.
11.07	Understand and use the metric system.
11.08	Convert inches to millimeters and millimeters to inches.
11.09	Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
11.10	Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
11.11	Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
11.12	Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
12.0	Demonstrate proficiency in appropriate understanding of basic sciences--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 appropriate communication skills--The student will be able to:
13.01	Write logical and understandable statements, or phrases, to accurately fill out forms and invoices commonly used in business and industry.
13.02	Read and use graphs, charts, diagrams, tables, parts manuals, and information sources commonly used in this industry/occupational area.
13.03	Read and follow written and oral instructions.
13.04	Answer and ask questions coherently and concisely.
13.05	Read critically by recognizing assumptions and implications and by evaluating ideas.
13.06	Demonstrate appropriate telephone/communication skills.
14.0	Demonstrate proficiency in electrical basics--The student will be able to:
14.01	Identify and use hand tools properly.
14.02	Demonstrate acceptable soldering and desoldering and rework and repair techniques.
14.03	Identify and use power tools properly.

CTE Standards and Benchmarks	
14.04	Identify sources of electricity.
14.05	Define voltage, current, resistance, power and energy.
14.06	Apply Ohm’s law and power formulas.
14.07	Measure properties of a circuit using appropriate test equipment.
14.08	Demonstrate electrostatic discharge (ESD) safety procedures.
14.09	Read and interpret color codes and symbols to identify electrical/electronic components and values.
15.0	Demonstrate a working knowledge of direct current circuits--The student will be able to:
15.01	Solve problems in electronic units utilizing metric prefixes.
15.02	Relate electricity to the nature of matter.
15.03	Identify sources of electricity.
15.04	Define voltage, current, resistance, power and energy.
15.05	Read and interpret color codes and symbols to identify electrical components and values.
15.06	Measure properties of a circuit using volt-ohm meter and digital volt-ohm meter meters and oscilloscopes.
15.07	Apply Ohm's law to series circuits.
15.08	Construct and verify operation of series circuits.
15.09	Analyze and troubleshoot series circuits.
15.10	Apply Ohm's law to parallel circuits.
15.11	Verify the operation of parallel circuits.
15.12	Analyze and troubleshoot parallel circuits.
15.13	Apply Ohm's law to parallel circuits.
15.14	Construct and verify the operation of combination circuits.
15.15	Troubleshoot combination circuits.
15.16	Describe magnetic properties of circuits and devices.
15.17	Determine the physical and electrical characteristics of capacitors and inductors.
16.0	Demonstrate a working knowledge of alternating current (AC) circuits--The student will be able to:
16.01	Identify properties of an AC signal.
16.02	Identify AC sources.

CTE Standards and Benchmarks	
16.03	Analyze and measure AC signals utilizing VOM, DVM, oscilloscope, frequency counter and function generator.
16.04	Define the characteristics of AC capacitive circuits.
16.05	Define the characteristics of AC inductive circuits.
16.06	Define basic motor theory and operation.
16.07	Define basic generator theory and operation.
17.0	Demonstrate proficiency in locating and repairing common installation and electrical problems in automobiles--The student will be able to:
17.01	Describe the overall effect of voltage drops and determine the points at which they can originate.
17.02	Measure voltage drops between two points.
17.03	Diagnose a voltage drop against a known good reference measurement.
17.04	Evaluate short circuits and determine how they can originate.
17.05	Locate and repair a short circuit between two points.
17.06	Evaluate open circuits and determine how they can originate.
17.07	Locate and repair an open circuit between two points.
17.08	Measure and evaluate critical components for proper functioning.
18.0	Demonstrate a working knowledge of dual trace oscilloscopes--The student will be able to:
18.01	Demonstrate proper operation and use of dual trace oscilloscope.
19.0	Demonstrate a working knowledge of electronically controlled charging system--The student will be able to:
19.01	System operation.
19.02	System diagnosis and repair.
20.0	Demonstrate proficiency in acceptable employee behavior in the automotive industry--The student will be able to:
20.01	Explain the effects of chemical/substance abuse.
20.02	Identify principles of stress management.
20.03	Demonstrate acceptable industry dress code.
20.04	Identify and demonstrate proper customer relation skills.
20.05	Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
20.06	Identify principles of time management.
20.07	Identify acceptable customer relations.

CTE Standards and Benchmarks	
21.0	Demonstrate a working knowledge of system diagnosis and repair--The student will be able to:
21.01	Describe system check.
21.02	Diagnose and differentiate between mechanical and electrical problems.
22.0	Demonstrate a working knowledge of vehicle electrical systems--The student will be able to:
22.01	Define basic transistor theory and operation.
22.02	Define basic Operational amplifier theory and operation.
22.03	Define basic Integrated Circuit theory and operation.
22.04	Define basic Logic Gate theory and operation.
22.05	Define basic Switching Power Supply theory and operation.
22.06	Define basic Data Bus Systems and Serial Data theory.
22.07	Define basic Electronic Control Units and Sensors theory and operation.
22.08	Define basic OBD theory and operation.
22.09	Define basic Multimedia and Control Network theory and operation.
22.10	Interpret ANSI/CEA-2012 Standard.
22.11	Define basic Hybrid Gas-electric Vehicle theory and operation.
22.12	Identify High-voltage systems.
22.13	Define basic OBD theory and operation.
22.14	Define basic Integrated Starter Alternator (ISA) theory and operation.
23.0	Demonstrate a working knowledge of advanced installation knowledge and techniques--The student will be able to:
23.01	Identify and use power and pneumatic tools properly.
23.02	Demonstrate general vehicle disassembly.
23.03	Demonstrate basic fabrication techniques and proper use of fabrication materials.
23.04	Demonstrate acceptable electronic testing and proper use of test equipment.
23.05	Define basic aftermarket amplifier installation and operation.
23.06	Identify troubleshooting steps for aftermarket amplifier problems.
24.0	Demonstrate a working knowledge of advanced mobile audio/video systems--The student will be able to:
24.01	Demonstrate proper vehicle disassembly for audio system installations

CTE Standards and Benchmarks	
24.02	Identify audio source formats.
24.03	Identify Mobile audio source units.
24.04	Identify headunit installation considerations.
24.05	Demonstrate OEM Integration of audio inputs.
24.06	Identify and explain proper operation of OEM interface devices.
24.07	Define basic audio signal processing theory and operation.
24.08	Define basic mobile audio amplifiers theory and operation.
24.09	Define basic passive crossover networks theory and operation.
24.10	Identify speaker types and enclosures.
24.11	Define basic sound fundamentals.
24.12	Demonstrate speaker installation.
24.13	Define basic digital and multi-channel sound theory and operation.
24.14	Define basic video theory and operation.
24.15	Identify video output formats.
24.16	Demonstrate OEM audio integration with a video system installation.
24.17	Identify troubleshooting steps for common video system installation problems.
25.0	Demonstrate a working knowledge of advanced security and convenience systems--The student will be able to:
25.01	Demonstrate proper vehicle disassembly for security and convenience installations.
25.02	Identify OEM anti-theft systems.
25.03	Define advanced security topics.
25.04	Demonstrate proper identification of vehicle circuits.
25.05	Demonstrate proper security system placement and mounting.
25.06	Demonstrate troubleshooting common security system problems.
25.07	Identify security and convenience system accessories.
25.08	Demonstrate alternative security system applications.
25.09	Demonstrate remote start system installation.
25.10	Identify critical remote starter connections.

CTE Standards and Benchmarks	
	25.11 Demonstrate proper OEM security interface and bypass for remote starter installation.
	25.12 Identify safety considerations required while installing and configuring a remote start system.
	25.13 Identify troubleshooting steps for remote start systems.
26.0	Demonstrate a working knowledge of advanced in-vehicle information and control systems--The student will be able to:
	26.01 Identify relevant data presented to drivers.
	26.02 Identify types of data available via satellite.
	26.03 Identify methods for sending data from vehicles.
	26.04 Identify subscription services.
	26.05 Demonstrate installation of satellite radio systems.
	26.06 Demonstrate installation of consumer telemetric systems.
	26.07 Demonstrate installation of CB radio systems.
	26.08 Demonstrate methods for integration and interfacing with on-board systems.
	26.09 Identify troubleshooting steps for in-vehicle information systems.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Aircraft Coating and Corrosion Control Technology**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T400500
CIP Number	0647060701
Grade Level	30, 31
Standard Length	600 hours
Teacher Certification	AIR MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	51-9122 – Painters, Transportation Equipment
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 10

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 topics: Safety and Health, Aircraft Structures, Aircraft Corrosion, Paint Removal Systems, and Paint Application Systems.

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

Program Structure

This program is a planned sequence of instruction consisting of four (4) courses, and two (2) occupational completion points.

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
	AMT0125	Aircraft Coating Safety, Inspection and Environmental Regulations	140 Hours	51-9122
A	AMT0133	Aircraft Surface Prep Technician	152 Hours	51-9122
	AMT0126	Aircraft Coatings Technician	160 Hours	51-9122
B	AMT0940	Aircraft Coatings Technician Internship	148 Hours	51-9122

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate appropriate understanding of basic safety, health and science concepts.
02.0 Identify various types of aircraft structures and components that require paint/coating applications.
03.0 Identify metallic and non-metallic aircraft structural materials.
04.0 Identify various types of corrosion found on aircraft surfaces.
05.0 Demonstrate proficiency in the removal and treatment of aircraft surface corrosion.
06.0 Demonstrate proficiency in paint removal techniques.
07.0 Demonstrate understanding of masking techniques and their importance.
08.0 Describe various aircraft coating materials used on aircraft structures.
09.0 Demonstrate proficiency in preparing non-metallic and metallic aircraft surfaces for coatings application.
10.0 Demonstrate the ability to select and adjust various types of paint application equipment.
11.0 Demonstrate the ability to select and properly apply required coating materials on aircraft surfaces.
12.0 Demonstrate the ability to set-up and apply various letters, numbers, insignias and decorative decals.
13.0 Demonstrate proficiency in the inspection of applied coatings.
14.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Aircraft Coating and Corrosion Control Technology**
PSAV Number: **T400500**

Course Number: AMT0125
Occupational Completion Point: A (1 of 2)
Aircraft Coating Safety, Inspection and Environmental Regulations – 140 Hours – SOC Code 51-9122

Course Description:
The Aircraft Coating Safety, Inspection and Environmental Regulations course prepares students for entry into the aircraft coating and corrosion control industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study basic safety, health, and science concepts.

CTE Standards and Benchmarks	
01.0	Demonstrate appropriate understanding of basic safety, health and science concepts.--The student will be able to:
01.01	Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
01.02	Identify various chemicals used in the aircraft coatings process.
01.03	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.
01.04	Understand the use of personal protection equipment (PPE)
01.05	Understand the proper use of fall protection systems (ANSI Z359)
01.06	Understand pressure measurement in terms of P.S.I. and inches of mercury.
01.07	Understand the regulatory agency requirements for hazardous materials and hazardous waste.

Course Number: AMT0133
Occupational Completion Point: A (2 of 2)
Aircraft Surface Prep Technician – 152 Hours – SOC Code 51-9122

Course Description:
The Aircraft Surface Prep Technician course is designed to build on the skills and knowledge students learned in the Aircraft Coating Safety, Inspection and Environmental Regulations for entry into the aircraft coating and corrosion control industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study aircraft structures and components, metallic and non-metallic materials, types of corrosion, removal and treatment, paint removal, and masking techniques.

CTE Standards and Benchmarks	
02.0	Identify various types of aircraft structures and components that require paint/coating applications.--The student will be able to:
02.01	Identify the major sections of various sizes of fixed and rotary wing aircraft.
02.02	Identify the various removable flight controls.
02.03	Locate aircraft frame stations, butt lines and waterlines.
03.0	Identify metallic and non-metallic aircraft structural materials.--The student will be able to:
03.01	Identify aircraft materials using the applicable aircraft structural manuals.
03.02	Describe ferrous and non-ferrous aircraft materials.
03.03	Describe the various non-metallic materials used on aircraft.
03.04	Visually Identify composite materials.
03.05	Identify aircraft fabric coverings.
04.0	Identify various types of corrosion found on aircraft surfaces.--The student will be able to:
04.01	Discuss the theory of corrosion.
04.02	Describe the different types of corrosion on aircraft.
04.03	Detect corrosion on an aircraft structure.
05.0	Demonstrate proficiency in the removal and treatment of aircraft surface corrosion.--The student will be able to:
05.01	Select proper methods for the removal of various types of corrosion.
05.02	Remove corrosion from an aircraft structure.
05.03	Select the proper treatment methods for the prevention of corrosion.
05.04	Properly treat an aircraft surface.
06.0	Demonstrate proficiency in aircraft paint removal techniques.--The student will be able to:
06.01	Identify various paint removal methods for all aircraft materials.

CTE Standards and Benchmarks	
	06.02 Select proper coating removal method for specific areas and materials of aircraft.
	06.03 Demonstrate proficiency in removing coatings from an aircraft.
07.0	Demonstrate understanding of masking techniques and their importance.--The student will be able to:
	07.01 Identify areas/materials of aircraft that require protection from chemicals used in the aircraft coatings process.
	07.02 Select masking materials and techniques for various applications.
	07.03 Demonstrate proficiency in masking techniques.

Florida Department of Education
Student Performance Standards

Course Number: AMT0126
Occupational Completion Point: B (1 of 2)
Aircraft Coatings Technician – 160 Hours – SOC Code 51-9122

Course Description:
The Aircraft Coatings Technician course prepares students for entry into the aircraft coating and corrosion control industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study coating materials, surface preparation, paint application equipment, and selection of coating materials

CTE Standards and Benchmarks	
08.0	Describe various aircraft coating materials used on aircraft structures.--The student will be able to:
08.01	Identify various aircraft paints and primers required on aircraft using specific manufactures' information.
08.02	Determine coating compatibility with various aircraft materials.
08.03	Identify various sealant materials and their uses.
08.04	Determine proper mixing ratios of primers, paints and sealants in accordance with manufacturer's requirements.
09.0	Demonstrate the ability to select and adjust various types of paint application equipment.--The student will be able to:
09.01	Identify various types of equipment used in the aircraft coatings process.
09.02	Select proper equipment for specific coating systems.
09.03	Set up equipment for specific paint applications.
10.0	Demonstrate the ability to select and properly apply required coating materials on aircraft surfaces.--The student will be able to:
10.01	Select proper coatings to be applied to specific aircraft surfaces.
10.02	Properly mix coatings in accordance with manufacturer's recommendations.
10.03	Apply coatings using various types of equipment and methods.
11.0	Demonstrate the ability to set-up and apply various letters, numbers, insignias and decorative decals.--The student will be able to:
11.01	Select proper coatings to be applied to specific aircraft.
11.02	Properly mix coatings in accordance with manufacturer's recommendations.
11.03	Determine proper processes for applying coatings with acceptable results.
11.04	Apply coatings using various types of equipment and methods.

Course Number: AMT0940
Occupational Completion Point: B (2 of 2)
Aircraft Coatings Technician Internship – 148 Hours – SOC Code 51-9122

Course Description:
The Aircraft Coatings Technician Internship course is designed to build on the skills and knowledge students learned in the Aircraft Coatings Technician for entry into the aircraft coating and corrosion control industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study set-up and application of aircraft identification markings, inspection of applied coatings, and employability skills.

CTE Standards and Benchmarks	
12.0	Demonstrate proficiency in preparing non-metallic and metallic aircraft surfaces for coatings application.--The student will be able to:
12.01	Identify surface treatment methods for metallic and non-metallic surfaces.
12.02	Identify proper methods of surface treatment for various coatings.
12.03	Properly treat and prepare various surface materials for specific coating applications.
13.0	Demonstrate proficiency in the inspection of applied coatings.--The student will be able to:
13.01	Identify flaws in applied coatings
13.02	Determine acceptance criteria on applied coatings
13.03	Develop a plan to repair coating flaws.
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 a 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 acceptable work habits.
14.08	Demonstrate knowledge of how to make job changes appropriately.
14.09	Demonstrate acceptable employee health habits.
14.10	Demonstrate knowledge of the “right-to-know law” as recorded in (29 CFR-1910.1200)

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Automotive Service Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T400700
CIP Number	0647060411
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	AUTO IND @7 %7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023 – Automotive Service Technicians and Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

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

NOTE: It is recommended that students complete **OCP-A (Automobile Services Assistor)** and/or demonstrate mastery of the outcomes in **OCP-A (Automobile Services Assistor)** prior to enrolling in additional Automotive Service Technology courses. **The sequence of OCP's, after completing and/or demonstrating mastery of OCP-A (Automobile Services Assistor), is at the discretion of the instructor.**

For institutions using this framework, the National Automotive Technicians Education Foundation (NATEF) highly recommends the Master Automotive Service Technology (MAST) program Certification/Accreditation. Florida Statute (F.S.) 1004.925 – Automotive service technology education programs; certification. – requires all automotive service technology education programs shall be industry certified in accordance with rules adopted by the State Board of Education.

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

When offered at the postsecondary 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 **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0014	Automobile Services Assistor	300 hours	49-3023
B	AER0418	Automotive Brake System Technician	150 hours	49-3023
C	AER0453	Automobile Suspension and Steering Technician	150 hours	49-3023
D	AER0360	Automotive Electrical/Electronic System Technician	300 hours	49-3023
E	AER0110	Engine Repair Technician	150 hours	49-3023

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Automotive Service Technology program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry.
02.0 Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
03.0 Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.
04.0 Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.
05.0 Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires.
06.0 Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.
07.0 Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems.

Florida Department of Education
Student Performance Standards

Program Title: **Automotive Service Technology**
PSAV Number: **T400700**

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

Course Description:
The Automotive Service Assistor course prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study equipment skills, safety regulations, routine maintenance, and customer service.

Abbreviations:
ASE = Required Supplemental Tasks

For every task in Automotive Services Assistor course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

CTE Standards and Benchmarks		Priority Number
01.0	Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry--The student will be able to:	
01.01	Identify and apply general shop safety rules and procedures, EPA and OSHA standards.	ASE
01.02	Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.	
01.03	Research, identify, and interpret the Federal 'Workers Right To Know Law'.	
01.04	Identify and use appropriate emergency first aid procedures.	
01.05	Utilize and demonstrate safe procedures for handling of tools and equipment.	ASE
01.06	Identify and use proper placement of floor jacks and jack stands.	ASE
01.07	Identify and use proper procedures for safe lift operation.	ASE
01.08	Utilize proper ventilation procedures for working within the lab/shop area.	ASE
01.09	Identify and use proper procedures for safe pit usage.	

CTE Standards and Benchmarks		Priority Number
01.10	Identify marked safety areas.	ASE
01.11	Identify the location and the types of fire extinguishers and other fire safety equipment.	ASE
01.12	Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment.	ASE
01.13	Identify the location and use of eye wash stations.	ASE
01.14	Identify the location of the posted evacuation routes.	ASE
01.15	Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	ASE
01.16	Identify and wear appropriate clothing for lab/shop activities.	ASE
01.17	Secure hair and jewelry for lab/shop activities.	ASE
01.18	Use proper handling procedures for automotive fluids.	
01.19	Identify and describe typical automotive lubricants and lubricant properties.	
01.20	Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.	
01.21	Identify and describe typical automotive seals and gaskets.	
01.22	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	ASE
01.23	Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.	
01.24	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)	ASE
01.25	Locate and demonstrate knowledge of material safety data sheets (MSDS).	ASE
02.0	Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry--The student will be able to:	
02.01	Identify tools and equipment and their appropriate usage in automotive applications.	ASE
02.02	Identify and use standard and metric measurement skills and designation.	ASE
02.03	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	ASE
02.04	Demonstrate proper use of precision-measuring tools (i.e. micrometer, digital/dial-indicator, digital/dial-caliper) and torque methods.	ASE
03.0	Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services --The student will be able to:	
03.01	Identify information needed and the service requested on a repair order.	ASE
03.02	Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.	
03.03	Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.	ASE

CTE Standards and Benchmarks		Priority Number
03.04	Demonstrate use of the three C's (Concern, Cause, and Correction).	ASE
03.05	Review vehicle service history.	ASE
03.06	Use computer and operate keyboard.	
03.07	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	ASE
03.08	Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.	
03.09	Determine the presence of a Tire Pressure Monitoring System (TPMS).	
03.10	Determine the presence of wheel locks.	
03.11	Determine the presence of an air suspension system.	
03.12	Check operation and status of instrument panel warning lights and gauges.	
03.13	Locate and use the Vehicle Identification Number (VIN).	
03.14	Locate and use vehicle information placards, decals, tags, as required.	
03.15	Locate and use paper and electronic manuals.	
03.16	Locate and use technical service bulletins (TSBs).	
03.17	Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.	
03.18	Use proper chemicals for cleaning and lubrication.	
03.19	Reset maintenance indicators.	
03.20	Verify status of instrument panel warning lights and gauges.	
03.21	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).	ASE
03.22	Inspect underhood area for leaks, damage, and unusual conditions.	
03.23	Determine fluid type requirements and identify fluid.	
03.24	Check engine oil level and condition; service as required.	
03.25	Check engine coolant level and condition; service as required.	
03.26	Check power steering fluid level and condition; service as required.	
03.27	Check brake fluid level and condition; service as required.	
03.28	Check hydraulic clutch fluid and condition; service as required.	
03.29	Check windshield washer fluid level and condition; service as required.	

CTE Standards and Benchmarks	Priority Number
03.30 Check automatic transmission fluid level and condition; service as required.	
03.31 Inspect undercar area for leaks, damage, and unusual conditions.	
03.32 Check differential/transfer case fluid level; note unusual conditions; service as required.	
03.33 Check manual transmission fluid level; note unusual conditions; service as required.	
03.34 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear.	
03.35 Lubricate driveline, suspension and steering systems.	
03.36 Inspect cooling system pipes and hoses for wear, damage, and proper routing.	
03.37 Change engine oil and filter.	
03.38 Replace inline fuel filters as applicable.	
03.39 Inspect and replace air filter.	
03.40 Inspect and replace cabin air filter.	
03.41 Inspect, replace and adjust drive belts; inspect tensioners and pulleys.	
03.42 Document observed damage, unusual conditions, and concerns.	
03.43 Visually inspect struts, springs, and related components.	
03.44 Visually inspect stabilizer bar, bushings, brackets, and links.	
03.45 Visually inspect springs, torsion bars, and related components.	
03.46 Visually inspect shock absorbers and related components.	
03.47 Visually inspect constant velocity (CV) axle shaft boots.	
03.48 Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).	
03.49 Identify nitrogen-filled tires.	
03.50 Inspect tires; inspect spare and mounting system; check and adjust tire pressure.	
03.51 Rotate tires according to recommendations.	
03.52 Balance wheel and tire assembly.	
03.53 Dismount, inspect, and remount tire on wheel.	
03.54 Repair tire according to industry standards.	
03.55 Reinstall wheel; torque wheel fasteners to specification.	
03.56 Check wheel bearings for play and other signs of wear.	

CTE Standards and Benchmarks	Priority Number
03.57 Perform a visual inspection of a brake drum system.	
03.58 Perform a visual inspection of a disc brake system.	
03.59 Check parking brake operation; check parking brake components for unusual conditions.	
03.60 Document damage, unusual conditions and concerns.	
03.61 Check wiper blades, inserts, and arms; replace wiper blades or inserts.	
03.62 Lubricate door latches and hinges.	
03.63 Inspect fuel cap and seal.	
03.64 Charge battery as needed.	
03.65 Inspect and clean battery hold-downs; repair or replace as needed.	
03.66 Inspect and clean battery and battery cable clamp connections.	
03.67 Perform battery, starting, and charging system tests using appropriate tester.	
03.68 Start vehicle using an auxiliary power supply.	
03.69 Maintain or restore electronic memory functions if required.	
03.70 Test and replace fuses; confirm proper circuit operation.	
03.71 Inspect and replace exterior and courtesy lamps.	

Florida Department of Education
Student Performance Standards

Course Number: AER0418
Occupational Completion Point: B
Automotive Brake System Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automotive Brake System Technician prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of brake systems, drum brakes, disc brakes, power assist units, electronic brakes, traction, and stability control.

Abbreviations:
BR = Brakes

For every task in Automotive Brake System Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

BR Task List:	
P-1	**= 34**
P-2	**= 12**
P-3	**= 11**
Total	**57**

CTE Standards and Benchmarks		Priority Number
04.0	Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems--The student will be able to:	
04.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
04.02	Identify and interpret brake system concern; determine necessary action.	P-1
04.03	Describe procedures for performing a road test to check brake system operation; including an antilock brake system (ABS).	P-1
04.04	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
04.05	Install wheel and torque lug nuts.	P-1
04.06	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).	
04.07	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1
04.08	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
04.09	Check master cylinder for internal/external leaks and proper operation; determine necessary action.	P-1
04.10	Remove, bench bleed, and reinstall master cylinder.	P-1
04.11	Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P-3
04.12	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; check for loose fittings and supports; determine necessary action.	P-1
04.13	Replace brake lines, hoses, fittings, and supports.	P-2
04.14	Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	P-2
04.15	Select, handle, store, and fill brake fluids to proper level.	P-1
04.16	Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.	
04.17	Inspect, test, and/or replace components of brake warning light system.	P-3
04.18	Identify components of brake warning light system.	P-2
04.19	Bleed and/or flush brake system.	P-1
04.20	Test brake fluid for contamination.	P-1
04.21	Diagnose poor drum brake stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P-1
04.22	Remove, clean, inspect, and measure brake drums; determine necessary action.	P-1
04.23	Refinish brake drum and measure final drum diameter; compare with specifications.	P-1
04.24	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
04.25	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-2
04.26	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.	P-2
04.27	Install wheel, torque lug nuts, and make final checks and adjustments associated with drum brakes.	
04.28	Diagnose poor disk brake stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	P-1
04.29	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.	P-1
04.30	Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.	P-1
04.31	Remove, inspect, and replace pads and retaining hardware; determine necessary action.	P-1
04.32	Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.	

CTE Standards and Benchmarks		Priority Number
04.33	Lubricate and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	P-1
04.34	Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral run out; determine necessary action.	P-1
04.35	Remove and reinstall rotor.	P-1
04.36	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.	P-1
04.37	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.	P-1
04.38	Retract and re-adjust caliper piston on an integrated parking brake system.	P-3
04.39	Install wheel, torque lug nuts, and make final checks and adjustments associated with disc brakes.	
04.40	Check brake pad wear indicator; determine necessary action.	P-2
04.41	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.	P-1
04.42	Check brake pedal travel with, and without engine running to verify proper power booster operation.	P-2
04.43	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P-1
04.44	Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.	P-1
04.45	Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.	P-3
04.46	Measure and adjust master cylinder pushrod length.	P-3
04.47	Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.	P-3
04.48	Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.	P-1
04.49	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	P-2
04.50	Check parking brake operation and parking brake indicator light system; determine necessary action.	P-1
04.51	Check operation of brake stop light system.	P-1
04.52	Replace wheel bearing and race.	P-2
04.53	Inspect and replace wheel studs.	P-1
04.54	Remove and reinstall sealed wheel bearing assembly.	P-2
04.55	Identify and inspect electronic brake control system components; determine necessary action.	P-1
04.56	Identify traction control/vehicle stability control system components.	P-3
04.57	Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
04.58	Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.	P-2
04.59	Depressurize high-pressure components of the electronic brake control system.	P-3
04.60	Bleed the electronic brake control system hydraulic circuits.	P-1
04.61	Remove and install electronic brake control system electrical/electronic and hydraulic components.	
04.62	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).	P-3
04.63	Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).	P-3
04.64	Describe the operation of a regenerative braking system.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0453
Occupational Completion Point: C
Automotive Suspension and Steering Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automotive Suspension and Steering Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of general suspension, steering systems, front suspensions, rear suspensions, wheel alignment, and tires.

Abbreviations:
SS = Suspension and Steering

For every task in Automotive Suspension and Steering Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

SS Task List:	
P-1 =	**23**
P-2 =	**22**
P-3 =	**12**
Total	**57**

CTE Standards and Benchmarks		**Priority Number**
05.0	Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires –The student will be able to:	
05.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
05.02	Identify and interpret suspension and steering system concerns; determine necessary action.	P-1
05.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
05.04	Locate and interpret vehicle and major component identification numbers.	
05.05	Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1
05.06	Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1
05.07	Inspect, remove, and install upper and lower control arms, bushings, shafts, and rebound and jounce bumpers.	P-3
05.08	Inspect, remove and install strut rods and bushings.	P-3

CTE Standards and Benchmarks		Priority Number
05.09	Inspect, remove and install upper and/or lower ball joints (with or without wear indicators).	P-2
05.10	Inspect, remove and install steering knuckle assemblies.	P-3
05.11	Inspect, remove and install short and long arm suspension system coil springs and spring insulators.	P-3
05.12	Inspect, remove and install torsion bars and mounts.	P-3
05.13	Inspect, remove and install front stabilizer bar (sway bar) bushings, brackets, and links.	P-3
05.14	Inspect, remove and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.	P-3
05.15	Inspect, remove and install track bar, strut rods/radius arms and related mounts and bushings.	P-3
05.16	Inspect rear suspension system leaf spring(s), bushings, center pins/bolts and mounts.	P-1
05.17	Inspect, remove, and replace shock absorbers; inspect mounts and bushings.	P-1
05.18	Remove, inspect, and service or replace front and rear wheel bearings.	P-1
05.19	Describe the function of the power steering pressure switch.	P-3
05.20	Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concern; determine necessary action.	P-1
05.21	Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.	P-1
05.22	Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.	P-1
05.23	Check toe-out-on-turns (turning radius); determine necessary action.	P-2
05.24	Check SAI (steering axis inclination) and included angle; determine necessary action.	P-2
05.25	Check rear wheel thrust angle; determine necessary action.	P-1
05.26	Check for front wheel setback; determine necessary action.	P-2
05.27	Check front and/or rear cradle (sub-frame) alignment; determine necessary action.	P-3
05.28	Reset steering angle sensor.	P-2
05.29	Disable and enable supplemental restraint system (SRS).	P-1
05.30	Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).	P-1
05.31	Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.	P-2
05.32	Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
05.33	Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; perform necessary action.	P-2
05.34	Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.	P-2
05.35	Adjust non-rack and pinion worm bearing preload and sector lash.	
05.36	Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.	P-2
05.37	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.	P-2
05.38	Determine proper power steering fluid type; inspect fluid level and condition.	P-1
05.39	Flush, fill, and bleed power steering system.	P-2
05.40	Inspect for power steering fluid leakage; determine necessary action.	P-1
05.41	Remove, inspect, replace, and adjust power steering pump drive belt.	P-1
05.42	Remove and reinstall power steering pump.	P-2
05.43	Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.	P-2
05.44	Inspect and replace power steering hoses and fittings.	P-2
05.45	Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.	P-2
05.46	Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.	P-1
05.47	Test and diagnose components of electronically-controlled steering systems using a scan tool; determine necessary action.	P-3
05.48	Inspect electric power-assisted steering.	P-3
05.49	Identify hybrid vehicle power steering system electrical circuits and safety precautions.	P-2
05.50	Inspect tire condition; identify tire wear patterns; check of correct tire size and application (load and speed rating) and adjust air pressure; determine necessary action.	P-1
05.51	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	P-2
05.52	Rotate tires according to manufacturer’s recommendations.	P-1
05.53	Measure wheel, tire, axle flange, and hub run out; determine necessary action.	P-2
05.54	Diagnose tire pull problems; determine necessary action.	P-2
05.55	Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).	P-1
05.56	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	P-2
05.57	Reinstall wheel; torque lug nuts.	

CTE Standards and Benchmarks		Priority Number
05.58	Inspect tire and wheel assembly for air loss; perform necessary action.	P-1
05.59	Repair tire using internal patch.	P-1
05.60	Identify and test pressure monitor system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lambs.	P-2
05.61	Demonstrate knowledge of steps required to remove and replace sensor in a tire pressure monitoring system.	P-1

Florida Department of Education
Student Performance Standards

Course Number: AER0360
Occupational Completion Point: D
Automotive Electrical/Electronic System Technician – 300 Hours – SOC Code 49-3023

Course Description:
The Automotive Electrical/Electronic System Technician prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of electrical/electronics, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.

Abbreviations:
EE = Electrical/Electronic Systems

For every task in Automotive Electrical/Electronic System Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

EE Task List:	
P-1	**= 36**
P-2	**= 14**
P-3	**= 8**
Total	**58**

CTE Standards and Benchmarks			Priority Number
06.0		Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems--The student will be able to:	
	06.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
	06.02	Identify and interpret electrical/electronic system concern; determine necessary action.	
	06.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
	06.04	Locate and interpret vehicle and major component identification numbers.	
	06.05	Diagnose and demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1
	06.06	Use wiring diagrams during diagnosis (troubleshooting) of electrical/electronic circuit problems.	P-1
	06.07	Demonstrate the proper use of a digital multimeter (DMM) when measuring source, voltage drop (including grounds), current flow, and resistance.	P-1
	06.08	Check operation of electrical circuits with a test light.	P-1

CTE Standards and Benchmarks		Priority Number
06.09	Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.	P-2
06.10	Check operation of electrical circuits using fused jumper wires.	P-1
06.11	Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-1
06.12	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.	P-1
06.13	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	P-1
06.14	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.	P-1
06.15	Replace electrical connectors and terminal ends.	P-1
06.16	Repair wiring harness.	P-1
06.17	Perform solder repair of electrical wiring.	P-1
06.18	Repair CAN/BUS wiring harness.	P-1
06.19	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.	
06.20	Perform battery state-of-charge test; determine necessary action.	P-1
06.21	Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.	P-1
06.22	Maintain or restore electronic memory functions.	P-1
06.23	Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.	P-1
06.24	Perform slow/fast battery charge according to manufacturer’s recommendations.	P-1
06.25	Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.	P-1
06.26	Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.	P-3
06.27	Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.	P-1
06.28	Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	P-3
06.29	Perform battery conductance test; determine necessary action.	
06.30	Perform starter current draw tests; determine necessary action.	P-1
06.31	Perform starter circuit voltage drop tests; determine necessary action.	P-1
06.32	Inspect and test starter relays and solenoids; determine necessary action.	P-2
06.33	Remove and install starter in a vehicle.	P-1
06.34	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
06.35	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	P-2
06.36	Perform charging system output test; determine necessary action.	P-1
06.37	Diagnose (troubleshoot) charging system for the cause of undercharge, no-charge, and overcharge conditions.	P-1
06.38	Inspect, adjust, or replace generator (alternator) drive belts, check pulleys, and tensioners for wear; check pulley and belt alignment.	P-1
06.39	Remove, inspect, and re-install generator (alternator).	P-1
06.40	Perform charging circuit voltage drop test; determine necessary action.	P-1
06.41	Diagnose (troubleshoot) the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	P-1
06.42	Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving light); replace as needed.	P-1
06.43	Aim headlights.	P-2
06.44	Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.	
06.45	Identify system voltage and safety precautions associated with high intensity discharge headlights.	P-2
06.46	Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.	P-2
06.47	Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.	
06.48	Diagnose (troubleshoot) the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	P-2
06.49	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.	
06.50	Diagnose (troubleshoot) causes of incorrect horn operation; perform necessary action.	P-1
06.51	Diagnose (troubleshoot) causes of incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	P-2
06.52	Diagnose (troubleshoot) windshield washer problems; perform necessary action.	P-2
06.53	Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.	P-2
06.54	Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.	
06.55	Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.	P-2
06.56	Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action	P-3
06.57	Diagnose (troubleshoot) supplemental restraint system (SRS) concerns; determine necessary action.	P-2
06.58	Disable and enable an airbag system for vehicle service; verify indicator lamp operation.	P-1

CTE Standards and Benchmarks		Priority Number
06.59	Diagnose (troubleshoot) radio static and weak, intermittent, or no radio reception; determine necessary action.	P-3
06.60	Remove and reinstall door panel.	P-1
06.61	Diagnose (troubleshoot) body electronic system circuits using a scan tool; determine necessary action.	P-3
06.62	Check for module communication (including CAN/BUS systems) using a scan tool.	P-2
06.63	Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems.	P-3
06.64	Describe the operation of keyless entry/remote-start systems.	P-3
06.65	Verify operation of instrument panel gauges and warning /indicator lights; reset maintenance indicator.	P-1
06.66	Verify windshield wiper and washer operation, replace wiper blades.	P-1
06.67	Describe the process for software transfers, software updates, or flash reprogramming on electronic modules.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0110
Occupational Completion Point: E
Engine Repair Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Engine Repair Technician prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of general engine, cylinder heads, valve trains, engine block, lubrication, and cooling systems.

Abbreviations:
ER = Engine Repair

For every task in Engine Repair Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

ER Task List:	
P-1	**23**
P-2	**17**
P-3	**11**
Total	**51**

CTE Standards and Benchmarks		Priority Number
07.0	Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems--The student will be able to:	
07.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1
07.02	Identify and interpret engine concern; determine necessary action.	
07.03	Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.	P-1
07.04	Verify operation of the instrument panel engine warning indicator.	P-1
07.05	Locate and interpret vehicle and major component identification numbers.	
07.06	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	P-1
07.07	Diagnose engine noises and vibrations; determine necessary action.	
07.08	Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action.	
07.09	Perform engine vacuum tests; determine necessary action.	

CTE Standards and Benchmarks		Priority Number
07.10	Perform cylinder power balance tests; determine necessary action.	
07.11	Remove and replace timing belt; verify correct camshaft timing.	P-1
07.12	Perform cylinder cranking and running compression tests; determine necessary action.	
07.13	Perform cylinder leakage tests; determine necessary action.	
07.14	Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.	P-3
07.15	Install engine covers using gaskets, seals and sealers as required.	P-1
07.16	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
07.17	Inspect, remove and replace engine mounts.	P-2
07.18	Identify hybrid vehicle internal combustion engine service precautions.	P-3
07.19	Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.	P-1
07.20	Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.	P-1
07.21	Inspect valve springs for squareness and free height comparison; determine necessary action.	P-3
07.22	Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action.	P-3
07.23	Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.	P-3
07.24	Inspect valves and valve seats; determine necessary action.	P-3
07.25	Check valve spring assembled height and valve stem height; determine necessary action.	P-3
07.26	Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.	P-2
07.27	Inspect valve lifters; determine necessary action.	P-2
07.28	Adjust valves (mechanical or hydraulic lifters).	P-1
07.29	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 valve timing components; verify correct camshaft timing.	P-1
07.30	Inspect and/or measure camshaft for run out, journal wear and lobe wear.	P-2
07.31	Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.	P-3
07.32	Establish camshaft position sensor indexing.	P-1
07.33	Remove, inspect, or replace crankshaft vibration damper (harmonic balancer).	P-2

CTE Standards and Benchmarks		Priority Number
07.34	Disassemble engine block; clean and prepare components for inspection and reassembly.	P-1
07.35	Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.	P-2
07.36	Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.	P-2
07.37	Deglaze and clean cylinder walls.	P-2
07.38	Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.	P-3
07.39	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
07.40	Inspect main and connecting rod bearings for damage and wear; determine necessary action.	P-2
07.41	Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.	P-3
07.42	Inspect and measure piston skirts and ring lands; determine necessary action.	P-2
07.43	Remove and replace piston pin.	
07.44	Determine piston-to-bore clearance.	P-2
07.45	Inspect, measure, and install piston rings.	P-2
07.46	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
07.47	Assemble engine block.	P-1
07.48	Perform oil pressure tests; determine necessary action.	P-1
07.49	Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.	P-2
07.50	Perform cooling system pressure and dye test to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core and gallery plugs; determine necessary action.	P-1
07.51	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.	P-1
07.52	Inspect and replace engine cooling and heater system hoses.	
07.53	Remove, inspect, and replace thermostat and gasket/seal.	P-1
07.54	Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.	P-1
07.55	Inspect, remove and replace water pump.	P-2
07.56	Remove and replace radiator.	P-2

CTE Standards and Benchmarks	Priority Number
07.57 Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.	P-1
07.58 Inspect auxiliary coolers; determine necessary action.	P-3
07.59 Inspect, test, and replace oil temperature and pressure switches and sensors.	P-2
07.60 Perform engine oil and filter change.	P-1
07.61 Identify causes of engine overheating.	P-1

Additional Information

Laboratory Activities

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

Special Notes

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Automotive Service Technology 2**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T400800
CIP Number	0647060412
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	AUTO IND @7 %7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023 – Automotive Service Technicians and Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

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

NOTE: It is recommended that students complete **OCP-A (Automobile Services Assistor) of Automotive Service Technology 1** and/or demonstrate mastery of the outcomes in **OCP-A (Automobile Services Assistor) of Automotive Service Technology 1** prior to enrolling in additional Automotive Service Technology courses. **The sequence of OCP's, after completing and/or demonstrating mastery of OCP-A (Automobile Services Assistor) of Automotive Service Technology 1, is at the discretion of the instructor.**

For institutions using this framework, the National Automotive Technicians Education Foundation (NATEF) highly recommends the Master Automotive Service Technology (MAST) program Certification/Accreditation. Florida Statute (F.S.) 1004.925 – Automotive service technology education programs; certification. – requires all automotive service technology education programs shall be industry certified in accordance with rules adopted by the State Board of Education.

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

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

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

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0503	Automotive Engine Performance Technician	300 hours	49-3023
B	AER0257	Automatic Transmission and Transaxle Technician	150 hours	49-3023
C	AER0274	Manual Drivetrain and Axle Technician	150 hours	49-3023
D	AER0172	Automotive Heating and Air Conditioning Technician	150 hours	49-3023

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Automotive Service Technology program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.
02.0 Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles.
03.0 Explain and apply proficiently the diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive.
04.0 Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.

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

Course Description:
The Automotive Engine Performance Technician course prepares students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.

Abbreviations:
EP = Engine Performance

For every task in Automotive Engine Performance Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

EP Task List:	
P-1 =	**21**
P-2 =	**17**
P-3 =	**9**
Total	**47**

CTE Standards and Benchmarks		**Priority Number**
01.0	Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems --The student will be able to:	
01.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
01.02	Identify and interpret engine performance concern; determine necessary action.	P-1
01.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
01.04	Locate and interpret vehicle and major component identification numbers.	
01.05	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	
01.06	Diagnose abnormal engine noise or vibration concerns; determine necessary action.	P-3
01.07	Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
01.08	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.	P-1
01.09	Perform cylinder power balance test; determine necessary action.	P-2
01.10	Perform cylinder cranking and running compression tests; determine necessary action.	P-1
01.11	Perform cylinder leakage test; determine necessary action.	P-1
01.12	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.	P-2
01.13	Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.	
01.14	Verify engine operating temperature; determine necessary action.	P-1
01.15	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.	
01.16	Verify correct camshaft timing.	P-1
01.17	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	P-1
01.18	Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.	P-1
01.19	Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action.	P-1
01.20	Check for module communication (including CAN/BUS systems) errors using a scan tool.	
01.21	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-2
01.22	Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1
01.23	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
01.24	Perform active tests of actuators using a scan tool; determine necessary action.	P-2
01.25	Describe the importance of running all OBDII monitors for repair verification.	P-1
01.26	Diagnose (troubleshoot) 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-2
01.27	Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.	
01.28	Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.	P-1
01.29	Remove and replace spark plugs; inspect secondary ignition components for wear and damage.	P-1

CTE Standards and Benchmarks		Priority Number
01.30	Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.	P-3
01.31	Diagnose (troubleshoot) 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-2
01.32	Check fuel for contaminants; determine necessary action.	P-2
01.33	Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.	P-1
01.34	Replace fuel filters.	P-1
01.35	Inspect, service or replace air filters, filter housing and intake duct work.	P-1
01.36	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.	P-2
01.37	Inspect and test fuel injectors.	P-2
01.38	Verify idle control operation.	P-1
01.39	Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform necessary action.	P-1
01.40	Inspect condition of exhaust system hangers, brackets, clamps and heat shields; repair or replace as needed.	P-1
01.41	Perform exhaust system back-pressure test; determine necessary action.	P-2
01.42	Check and refill diesel exhaust fluid (DEF).	P-3
01.43	Test the operation of turbocharger/supercharger systems; determine necessary action.	P-3
01.44	Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.	P-3
01.45	Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.	P-2
01.46	Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.	P-3
01.47	Diagnose emissions and driveability concerns caused by the secondary injection and catalytic converter systems; determine necessary action.	P-2
01.48	Inspect, test, service and replace components of the EGR system, including tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.	P-2
01.49	Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.	P-2
01.50	Inspect and test mechanical components of secondary air injection systems; perform necessary action.	
01.51	Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.	P-3
01.52	Inspect and test catalytic converter efficiency.	P-2

CTE Standards and Benchmarks		Priority Number
01.53	Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action.	P-2
01.54	Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.	P-1
01.55	Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.	P-3
01.56	Adjust valves on engines with mechanical or hydraulic lifters.	
01.57	Remove and replace timing belt; verify correct camshaft timing.	
01.58	Remove and replace thermostat and gasket/seal.	
01.59	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.	
01.60	Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.	
01.61	Perform engine oil and filter change.	
01.62	Identify hybrid vehicle internal combustion engine service precautions.	

Florida Department of Education
Student Performance Standards

Course Number: AER0257
Occupational Completion Point: B
Automatic Transmission and Transaxle Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automatic Transmission and Transaxle Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics, repair, service, and operation of automatic transmission/transaxles.

Abbreviations:
AT = Automatic Transmission/Transaxle

For every task in Automatic Transmission and Transaxle Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

AT Task List:	
P-1	**15**
P-2	**20**
P-3	**4**
Total	**39**

CTE Standards and Benchmarks		**Priority Number**
02.0	Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles --The student will be able to:	
02.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
02.02	Identify and interpret transmission/transaxle concern, differentiate between engine performance and transmission/transaxle concerns; determine necessary action.	P-1
02.03	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
02.04	Locate and interpret vehicle and major component identification numbers.	
02.05	Diagnose fluid loss and condition concerns; determine necessary action.	P-1
02.06	Check fluid level in a transmission or a transaxle equipped with a dipstick.	P-1
02.07	Check fluid level in a transmission or a transaxle not equipped with a dipstick.	P-1
02.08	Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
02.09	Perform stall test; determine necessary action.	P-3
02.10	Perform lock-up converter system tests; determine necessary action.	P-3
02.11	Diagnose noise and vibration concerns; determine necessary action.	P-2
02.12	Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.	P-1
02.13	Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).	P-2
02.14	Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.	P-1
02.15	Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.	P-2
02.16	Inspect for leakage; replace external seals, gaskets, and bushings.	P-2
02.17	Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses.	P-1
02.18	Diagnose electronic transmission control systems using a scan tool; determine necessary action.	
02.19	Inspect, replace, and align powertrain mounts.	P-2
02.20	Drain and replace fluids and filter(s).	P-1
02.21	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
02.22	Disassemble, clean, and inspect transmission/transaxle.	P-2
02.23	Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets).	P-2
02.24	Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action.	P-2
02.25	Assemble transmission/transaxle.	P-2
02.26	Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.	P-1
02.27	Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.	P-2
02.28	Install and seat torque converter to engage drive/splines.	
02.29	Inspect, measure, and reseal oil pump assembly and components.	P-2
02.30	Measure transmission/transaxle end play or preload; determine necessary action.	P-1
02.31	Inspect, measure, and replace thrust washers and bearings.	P-2
02.32	Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.	P-2

CTE Standards and Benchmarks		Priority Number
02.33	Inspect bushings; determine necessary action.	P-2
02.34	Inspect and measure planetary gear assembly components; determine necessary action.	P-2
02.35	Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action.	P-2
02.36	Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.	P-2
02.37	Inspect, measure, repair, adjust or replace transaxle final drive components.	P-2
02.38	Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action.	P-2
02.39	Measure clutch pack clearance; determine necessary action.	P-1
02.40	Air test operation of clutch and servo assemblies.	P-1
02.41	Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; determine necessary action.	P-2
02.42	Inspect bands and drums; determine necessary action.	
02.43	Describe the operational characteristics of a continuously variable transmission (CVT).	P-3
02.44	Describe the operational characteristics of a hybrid vehicle drive train.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0274
Occupational Completion Point: C
Manual Drivetrain and Axle Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Manual Drivetrain and Axle Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study diagnostics and repair of drive train, clutch, transmission, transaxle, half shaft universal, constant-velocity joint, rear axle, ring and pinion gears, differential case assemble, limited slip differential, drive shaft, and four wheel drive/all-wheel drive.

Abbreviations:
MD = Manual Drivetrain and Axles

For every task in Manual Drivetrain and Axle Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

MD Task List:	
	P-1 = 17
	P-2 = 12
	P-3 = 20
Total	**49**

CTE Standards and Benchmarks		**Priority Number**
03.0	Explain and apply proficiently the diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive- -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.	
03.02	Identify and interpret drive train concern; determine necessary action.	P-1
03.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
03.04	Check fluid condition; check for leaks; determine necessary action.	P-1
03.05	Locate and interpret vehicle and major component identification numbers.	
03.06	Diagnose fluid loss, level, and condition concerns; determine necessary action.	
03.07	Drain and refill manual transmission/transaxle and final drive unit.	P-1
03.08	Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
03.09	Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.	P-1
03.10	Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.	
03.11	Check and adjust clutch master cylinder fluid level; check for leaks.	P-1
03.12	Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).	P-1
03.13	Bleed clutch hydraulic system.	P-1
03.14	Inspect flywheel and ring gear for wear and cracks; determine necessary action.	P-1
03.15	Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.	
03.16	Measure flywheel run out and crankshaft end play; determine necessary action.	P-2
03.17	Remove and reinstall transmission/transaxle.	
03.18	Disassemble, inspect, clean, and reassemble internal transmission/transaxle components.	P-3
03.19	Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.	
03.20	Diagnose noise concerns through the application of transmission/transaxle powerflow principles.	P-2
03.21	Diagnose hard shifting and jumping out of gear concerns; determine necessary action.	P-2
03.22	Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.	P-2
03.23	Inspect, replace, and align powertrain mounts.	
03.24	Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.	
03.25	Remove and replace transaxle final drive.	
03.26	Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.	
03.27	Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.	
03.28	Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.	
03.29	Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.	P-3
03.30	Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.	
03.31	Inspect lubrication devices (oil pump or slingers); perform necessary action.	
03.32	Inspect, test, and replace transmission/transaxle sensors and switches.	
03.33	Describe the operational characteristics of an electronically controlled manual transmission/transaxle.	P-3

CTE Standards and Benchmarks		Priority Number
03.34	Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.	P-1
03.35	Diagnose universal joint noise and vibration concerns; perform necessary action.	P-2
03.36	Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.	P-1
03.37	Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.	P-1
03.38	Inspect, service, and replace shaft center support bearings.	
03.39	Check shaft balance and phasing; measure shaft run out; measure and adjust driveline angles.	P-2
03.40	Diagnose noise and vibration concerns; determine necessary action.	
03.41	Inspect and replace companion flange and pinion seal; measure companion flange run out.	P-2
03.42	Inspect ring gear and measure run out; determine necessary action.	P-3
03.43	Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings.	P-3
03.44	Measure and adjust drive pinion depth.	P-3
03.45	Measure and adjust drive pinion bearing preload.	P-3
03.46	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-3
03.47	Check ring and pinion tooth contact patterns; perform necessary action.	P-3
03.48	Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.	P-3
03.49	Reassemble and reinstall differential case assembly; measure run out; determine necessary action.	P-3
03.50	Diagnose noise, slippage, and chatter concerns; determine necessary action.	P-3
03.51	Clean and inspect differential housing; check for leaks; inspect housing vent.	P-2
03.52	Check and adjust differential housing fluid level.	P-1
03.53	Drain and refill differential housing.	P-1
03.54	Inspect and reinstall limited slip differential components.	
03.55	Measure rotating torque; determine necessary action.	P-3
03.56	Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.	P-2
03.57	Inspect and replace drive axle wheel studs.	P-1
03.58	Remove and replace drive axle shafts.	P-1
03.59	Inspect and replace drive axle shaft seals, bearings, and retainers.	P-2

CTE Standards and Benchmarks		Priority Number
03.60	Measure drive axle flange run out and shaft end play; determine necessary action.	P-2
03.61	Diagnose noise and vibration concerns; determine necessary action.	P-2
03.62	Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.	P-3
03.63	Remove and reinstall transfer case.	
03.64	Disassemble, service, and reassemble transfer case and components.	P-3
03.65	Inspect front-wheel bearings and locking hubs; perform necessary action(s).	P-3
03.66	Check for leaks at drive assembly seals; check vents; check lube level.	P-3
03.67	Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.	P-3
03.68	Diagnose noise, vibration, and unusual steering concerns; determine necessary action.	P-3
03.69	Identify concerns related to variations in tire circumference and/or final drive ratios.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0172
Occupational Completion Point: D
Automotive Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3023

Course Description:
The Automotive Heating and Air Conditioning Technician prepare students for entry into the automotive service industry. Students explore career opportunities and requirements of a professional auto mechanic. Students study the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.

Abbreviations:
HA = Heating and Air Conditioning

For every task in Automotive Heating and Air Conditioning Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

HA Task List:	
P-1 =	**17**
P-2 =	**17**
P-3 =	**4**
Total	**38**

CTE Standards and Benchmarks		**Priority Number**
04.0	Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling--The student will be able to:	
04.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
04.02	Identify and interpret heating and air conditioning problems; determine necessary action.	P-1
04.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
04.04	Locate and interpret vehicle and major component identification numbers.	
04.05	Performance test A/C system; identify problems.	P-1
04.06	Identify abnormal operating noises in the A/C system; determine necessary action.	P-2
04.07	Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings.	P-1
04.08	Leak test A/C system; determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
04.09	Inspect the condition of refrigerant oil removed from A/C system; determine necessary action.	P-2
04.10	Determine recommended oil and oil capacity for system application.	P-1
04.11	Using a scan tool, observe and record related HVAC data and trouble codes.	P-3
04.12	Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.	P-2
04.13	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.	P-1
04.14	Inspect, test, service or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.	P-2
04.15	Remove, inspect, and reinstall A/C compressor and mountings; determine recommended oil quantity.	P-2
04.16	Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.	P-2
04.17	Determine the need for an additional A/C system filter; perform necessary action.	P-3
04.18	Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.	P-2
04.19	Inspect A/C condenser for airflow restrictions; perform necessary action.	P-1
04.20	Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity.	P-2
04.21	Remove, inspect, and install expansion valve or orifice (expansion) tube.	P-1
04.22	Inspect evaporator housing water drain; perform necessary action.	P-1
04.23	Determine procedure to remove and reinstall evaporator; determine required oil quantity.	P-2
04.24	Remove, inspect, and reinstall condenser; determine required oil quantity.	P-2
04.25	Diagnose temperature control problems in the heater/ventilation system; (determine PCM) to interpret system operation; determine necessary action.	P-2
04.26	Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action.	
04.27	Inspect engine cooling and heater system hoses; perform necessary action.	P-1
04.28	Determine procedure to remove, inspect, and reinstall heater core.	P-2
04.29	Inspect, test, and replace thermostat and gasket/seal.	
04.30	Determine coolant condition and coolant type for vehicle application; drain and recover coolant.	
04.31	Flush system; refill system with recommended coolant; bleed system.	
04.32	Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.	
04.33	Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.	

CTE Standards and Benchmarks		Priority Number
04.34	Inspect and test heater control valve(s); perform necessary action.	P-2
04.35	Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.	P-1
04.36	Diagnose A/C compressor clutch control systems; determine necessary action.	P-2
04.37	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
04.38	Inspect and test A/C-heater control panel assembly; determine necessary action.	P-3
04.39	Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.	P-3
04.40	Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.	P-1
04.41	Identify the source of A/C system odors.	P-2
04.42	Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.	P-2
04.43	Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.	P-1
04.44	Identify and recover A/C system refrigerant.	P-1
04.45	Recycle, label, and store refrigerant.	P-1
04.46	Evacuate and charge A/C system; add refrigerant oil as required.	P-1

Additional Information

Laboratory Activities

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

Special Notes

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

The standard length of this program is 1800 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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	T400900
CIP Number	0647060415
Grade Level	30, 31
Standard Length	390 hours
Teacher Certification	AUTO MECH @7 7G CUST SERV 7G MKTG 1 @2 MKTG MGMT @7 7G RETAILING @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	43-4051 – Customer Service Representatives 43-5081 – Stock Clerks and Order Fillers 41-2031 – Retail Salespersons 43-1011 – First-Line Supervisors of Office and Administrative Support Workers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	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 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.

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

Program Structure
This program is a planned sequence of instruction consisting of four courses that culminate in one occupational completion point.

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
	AER0075	Introduction to Automotive Service Advisor	75 hours	43-5081
	AER0076	Introduction to Automotive Customer Service	75 hours	43-4051
	AER0070	Dealership Policies and Protocols	90 hours	43-1011
A	AER0945	Dealership Internship	150 hours	41-2031

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Describe the differences between aftermarket and original equipment manufacturers (OEM) in a global economy.
02.0 Identify, explain and list the tasks/duties assigned to the service consultant.
03.0 Explain the importance of professional image, employability skills and ethics.
04.0 Explain the team structure and task associated with each team position; identify the major responsibilities of the team leader.
05.0 Describe and outline the procedures for closing out both manual and computerized work orders, and notifying the customer.
06.0 Explain the various team approaches used in the automotive service industry to offer superior customer service
07.0 Demonstrate how to properly identify and document customer concerns and requests in person or over the phone and confirm accuracy of all information.
08.0 Demonstrate how to properly open a repair order, using identifying characteristics of the vehicle, and confirm accuracy for both computerized and paper repair orders.
09.0 Identify, and recommend service and maintenance needs to the customer in a timely, professional and friendly manner.
10.0 Present a plan to manage customer appointments.
11.0 Describe methods of promoting the service profit center (provide examples).
12.0 Explain how a positive, team-based work environment is related to productivity and job satisfaction.
13.0 Explain why customer expectations, effectiveness and efficiency are critical to a business.
14.0 Explain and demonstrate safety and environmental regulation compliance related to the automotive service industry
15.0 Describe and diagram automotive related organizational structures.
16.0 Explain the legal importance of accurate written communications using a repair order and describe how information is recorded and stored.
17.0 Describe the legal and financial importance of accurate repair order history.
18.0 Explain the legal and ethical consideration of proper repair order authorization.
19.0 Identify and complete financial measures, forms and documents that are required as part of the service consultant's duties.
20.0 Locate and use reference information such as: service bulletins, electronic service manuals, warranty procedures manuals, owner's manuals, and electronic dealership proprietary systems.
21.0 Define and use warranty policies and procedures/parameters. Explain the difference between first time warranty, repeat repair, fleet, and customer pay at a service facility.
22.0 Explain and demonstrate how to maximize the capability of the service facility by effective scheduling of workflow through collaborative groupware applications.
23.0 Demonstrate the proper procedure and condition for delivery of the vehicle back to the customer.
24.0 Demonstrate how to respond to difficult customer situations.

Florida Department of Education
Student Performance Standards

Program Title: **Automotive Service Advisor and Consultant**
PSAV Number: **T400900**

Course Number: AER0075
Occupational Completion Point: A (1 of 4)
Introduction to Automotive Service Advisor – 75 Hours – SOC Code 43-5081

Course Description:
The Introduction to Automotive Service Advisor course prepares students for entry into the automotive service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study aftermarket and original equipment manufacturers, duties of a service consultant, professional image, employability skills, ethics, team structures, closing manual and computerized work orders.

CTE Standards and Benchmarks	
01.0	Describe the differences between aftermarket and original equipment manufacturers (OEM) in a global economy—The student will be able to:
01.01	Describe the nature and types of business organizations.
01.02	Explain the impact of the global economy on business organizations.
01.03	Employ leadership skills to accomplish organizational goals and objectives.
01.04	Identify and define career opportunities in the automotive service industry.
01.05	Identify and apply communication skills used in automotive careers.
02.0	Identify, explain and list the tasks/duties assigned to the service consultant—The student will be able to:
02.01	List and describe quality control systems and/or practices common to the workplace.
02.02	Identify task/duties of a service consultant.
02.03	Explain the significance of each task/duty assigned to the service consultant.
03.0	Explain the importance of professional image, employability skills and ethics—The student will be able to:
03.01	Identify employment requirements for an automotive career.
03.02	Complete a job application form correctly.
03.03	Identify and adopt acceptable work habits.
03.04	Conduct a job search.
03.05	Demonstrate competence in job interview techniques.

CTE Standards and Benchmarks	
	03.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
	03.07 Demonstrate knowledge of how to make job changes appropriately.
	03.08 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
	03.09 Explain the effects of chemical/substance abuse.
	03.10 Demonstrate principles of stress management.
	03.11 Demonstrate acceptable industry dress code.
	03.12 Identify and demonstrate proper customer relation skills.
04.0	Explain team structure and the major responsibilities of the team leader—The student will be able to:
	04.01 Identify and describe team structures within a dealership service department.
	04.02 Identify responsibilities required of the team leader.
05.0	Describe and outline the procedures for closing out both manual and computerized work orders, and notifying the customer—The student will be able to:
	05.01 Write percents add fractions and decimals.
	05.02 Solve number word problems.
	05.03 Find the percent of a number.
	05.04 Operate a calculator.
	05.05 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
	05.06 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
	05.07 Write percents, add fractions and decimals.

Course Number: AER0076
Occupational Completion Point: A (2 of 4)
Introduction to Automotive Customer Service – 75 Hours – SOC Code 43-4051

Course Description:
The Introduction to Automotive Customer Service course is designed to build on the skills and knowledge students learned in the Introduction to Automotive Service Advisor course for entry into the automotive service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study team approaches to customer service, documentation of customer concerns, opening repair orders, service and maintenance recommendations, manage customer appointments, promotions, job satisfaction and productivity, customer expectations, safety, and environmental regulation.

CTE Standards and Benchmarks	
06.0	Explain the various team approaches used in the automotive service industry to offer superior customer service—The student will be able to:
06.01	Employ critical thinking skills independently and in teams to solve problems and make decisions.
06.02	Employ critical thinking and interpersonal skills to resolve conflicts.
06.03	Employ collaborative/groupware applications to facilitate group work.
06.04	Participate in meetings to accomplish work tasks.
07.0	Demonstrate how to properly identify and document customer concerns and requests in person or over the phone and confirm accuracy of all information—The student will be able to:
07.01	Present information formally and informally for specific purposes and audiences.
07.02	Demonstrate appropriate telephone/communication skills.
07.03	Read and follow written and oral instructions.
08.0	Demonstrate how to properly open a repair order, using identifying characteristics of the vehicle, and confirm accuracy for both computerized and paper repair orders—The student will be able to:
08.01	Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary.
08.02	Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
08.03	Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.
08.04	Determine the presence of a Tire Pressure Monitoring System (TPMS).
08.05	Determine the presence of wheel locks.
08.06	Determine the presence of an air suspension system.
08.07	Check operation and status of instrument panel warning lights and gauges.
08.08	Locate and use the Vehicle Identification Number (VIN).

CTE Standards and Benchmarks	
	08.09 Locate and use vehicle information placards, decals, tags, as required.
09.0	Identify, and recommend service and maintenance needs to the customer in a timely, professional and friendly manner—The student will be able to:
	09.01 Demonstrate appropriate telephone, electronic and in-person communication skills.
10.0	Present a plan to manage customer appointments—The student will be able to:
	10.01 Develop a plan to schedule customer appointments.
	10.02 Present a plan outlining the procedure for managing customer appointments.
11.0	Describe methods of promoting the service profit center (provide examples)—The student will be able to:
	11.01 Identify and describe various methods of promoting service.
	11.02 Create a promotional flyer for the service profit center that would be mailed to potential customers.
12.0	Explain how a positive, team-based work environment is related to productivity and job satisfaction—The student will be able to:
	12.01 Identify positive attributes of teams in relation to productivity and job satisfaction.
	12.02 Describe and model positive attributes related to team production.
13.0	Explain why customer expectations, effectiveness and efficiency are critical to a business—The student will be able to:
	13.01 Identify and describe customer expectation related to business success.
	13.02 Identify how efficiency is related to business success.
14.0	Explain and demonstrate safety and environmental regulation compliance related to the automotive service industry—The student will be able to:
	14.01 Apply shop safety rules, EPA and OSHA standards.
	14.02 Identify and use appropriate emergency first aid procedures.
	14.03 Identify and describe typical automotive lubricants and lubricant properties
	14.04 Interpret the Federal ‘Workers Right To Know Law'.
	14.05 Describe and identify supplemental restraint systems (SRS).
	14.06 Demonstrate acceptable employee health habits; including infection control of blood borne pathogens.
	14.07 Locate and use material safety data sheets (MSDS).
	14.08 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
	14.09 Explain emergency procedures to follow in response to workplace accidents.

Course Number: AER0077
Occupational Completion Point: A (3 of 4)
Dealership Policies and Protocols - 90 Hours – SOC Code 43-1011

Course Description:
The Dealership Policies and Protocols course is designed to build on the skills and knowledge students learned in the Introduction to Automotive Customer Service course for entry into the automotive service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study organizational structures, and legal and ethical importance of order accuracy.

CTE Standards and Benchmarks	
15.0	Describe and diagram automotive related organizational structures—The student will be able to:
15.01	Explain the effect of key organizational systems on performance and quality.
15.02	Interpret and explain written organizational policies and procedures.
15.03	Demonstrate working knowledge and proficiency of policies and procedures based on assigned work place (Dealer).
16.0	Explain the legal importance of accurate written communications using a repair order and describe how information is recorded and stored—The student will be able to:
16.01	Locate, comprehend and evaluate key elements of oral and written information.
16.02	Answer and ask questions coherently and concisely.
16.03	Read critically by recognizing assumptions and implications and by evaluating ideas.
16.04	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
17.0	Describe the legal and financial importance of accurate repair order history—The student will be able to:
17.01	Research and describe legal precedence related to repair orders.
17.02	Identify and describe the financial importance of accurate repair order history.
18.0	Explain the legal and ethical consideration of proper repair order authorization—The student will be able to:
18.01	Evaluate and justify decisions based on ethical reasoning.
18.02	Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities and employer policies.

Course Number: AER0945
Occupational Completion Point: A (4 of 4)
Dealership Internship - 150 Hours – SOC Code 43-2031

Course Description:
The Dealership Internship course is designed to build on the skills and knowledge students learned in the Dealership Policies and Protocols course for entry into the automotive service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study financial measures, forms and documentation, reference information, warranty policies, effective scheduling, collaborative groupware applications, and customer relations.

CTE Standards and Benchmarks	
19.0	Identify and complete financial measures, forms and documents that are required as part of the service consultant's duties—The student will be able to:
19.01	Describe the effect of money management on personal and career goals.
19.02	Develop a personal budget and financial goals.
19.03	Complete financial instruments for making deposits and withdrawals.
19.04	Maintain financial records.
19.05	Identify and define payroll deductions (taxes, insurance, and social security) employee benefits and pay systems.
19.06	Demonstrate principles of time management.
20.0	Locate and use reference information such as: service bulletins, electronic service manuals, warranty procedures manuals, owner's manuals, and electronic dealership proprietary systems—The student will be able to:
20.01	Use computer and operate keyboard.
20.02	Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.
20.03	Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.
20.04	Employ critical thinking skills independently and in teams to solve problems and make decisions.
20.05	Conduct technical research to gather information necessary for decision-making.
20.06	Identify information needed for the service requested on a repair order.
20.07	Locate and use paper and electronic manuals.
20.08	Locate and use technical service bulletins (TSBs).
20.09	Use personal information management (PIM) applications to increase workplace efficiency.
20.10	Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
20.11	Employ computer operations applications to access, create, manage, integrate, and store information.

CTE Standards and Benchmarks	
	20.12 Demonstrate proficiency in the use of dealership proprietary systems (based on site utilization).
21.0	Define and use warranty policies and procedures/parameters. Explain the difference between first time warranty, repeat repair, fleet, and customer pay at a service facility—The student will be able to:
	21.01 Identify policies and procedures associated with new vehicle sold in the United States.
	21.02 Identify policies and procedures related to an individual OEM.
	21.03 Identify and describe the procedure for submitting a work order under warranty conditions.
	21.04 Determine the proper procedure associated with warranty parts and claims.
22.0	Explain and demonstrate how to maximize the capability of the service facility by effective scheduling of workflow through collaborative groupware applications—The student will be able to:
	22.01 Identify and document workplace performance goals and monitor progress toward those goals.
23.0	Demonstrate the proper procedure and condition for delivery of the vehicle back to the customer—The student will be able to:
	23.01 Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.
	23.02 Ensure vehicle is prepared to return to customer per company policy (floor mats, steering wheel cover, etc.).
24.0	Demonstrate how to respond to difficult customer situations—The student will be able to:
	24.01 Identify scenarios when dealing with difficult customer situations.
	24.02 Identify and describe appropriate actions related to customer satisfaction.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Power Equipment Technologies**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T410300
CIP Number	0647060604
Grade Level	30,31
Standard Length	900 hours
Teacher Certification	GASENG RPR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3053 – Outdoor Power Equipment and Other Small Engine Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 8 Language: 8 Reading: 8

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 power and equipment technology industry and for a career as a small gas engine mechanic.

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.

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

Program Structure

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

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	SER0080	Power Equipment Service Technician 1	300 hours	49-3053
B	SER0081	Power Equipment Service Technician 2	300 hours	49-3053
C	SER0082	Power Equipment Service Technician 3	300 hours	49-3053

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate an understanding of workplace safety and workplace organization.
02.0 Demonstrate proficiency in performing pre-delivery maintenance services and set-up procedures
03.0 Demonstrate industry-related math skills
04.0 Demonstrate industry-related science skills
05.0 Demonstrate industry-related communication skills.
06.0 Demonstrate proficiency in parts inventory identification and repair order processing.
07.0 Perform basic fuel and exhaust system service.
08.0 Perform basic engine service and minor repairs.
09.0 Perform basic tune-up service.
10.0 Perform power transfer system service and engine controls adjustments.
11.0 Service and repair lubrication systems.
12.0 Diagnose, service, repair and adjust electrical systems
13.0 Service and repair cooling and exhaust systems.
14.0 Service and repair starting systems.
15.0 Diagnose and repair ignition systems.
16.0 Service, repair and adjust engine controls.
17.0 Understand basic two-stroke and four-stroke engines.
18.0 Demonstrate proficiency in repairing and maintaining two-stroke cycle engines.
19.0 Demonstrate proficiency in repairing and maintaining four-stroke cycle engines.
20.0 Demonstrate proficiency in repairing engine interior components.
21.0 Demonstrate proficiency in diagnosing and repairing power transfer systems.
22.0 Demonstrate proficiency in servicing, repairing, and adjusting various types of industry-related power and equipment
23.0 Demonstrate employability skills.
24.0 Demonstrate proficiency in acceptable employee behavior.
25.0 Demonstrate an understanding of entrepreneurship.
26.0 Diagnose, service, repair and adjust portable generators.
27.0 Demonstrate and identify basic principles of electronic fuel management (EFI) systems.

Florida Department of Education
Student Performance Standards

Program Title: **Power and Equipment Technology**
PSAV Number: **T410300**

Course Number: SER0080
Occupational Completion Point: A
Power Equipment Service Technician 1 – 300 Hours – SOC Code 49-3053

Course Description:
The Power Equipment Service Technician 1 course prepares students for entry into Power Equipment Service Technician 2. Students will learn entry-level skills for entry into the outdoor power equipment and other small engine mechanical industries. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of workplace safety and organization; pre-service maintenance and set-up procedures; industry related math, science, and communication skills; part inventory identification; basic fuel and exhaust systems; basic engine service; basic tune-up; transfer systems and engine controls; lubrication; electrical systems; cooling and exhaust systems; starting and ignition systems; and basic two-stroke and four-stroke engines.

For every task in Power Equipment Service Technician 1, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of workplace safety and workplace organization--The student will be able to:
01.01	Identify federal and state standards for health and safety, including the “Right-to-Know” law, as recorded in (29 CFR-1910.1200).
01.02	Identify, demonstrate, apply, and provide evidence of understanding shop safety requirements, organization and management on an ongoing basis.
01.03	Identify safety requirements for manual, electrical-powered, and pneumatic tools.
01.04	Demonstrate, apply, and provide evidence of safely using manual, electrical-powered, and pneumatic tools.
01.05	Identify safety requirements for operation of automated machines and equipment.
01.06	Demonstrate, apply, and provide evidence of safely operating automated machines and equipment.
01.07	Identify the safe use of fuels, chemicals, and compounds
01.08	Demonstrate, apply, and provide evidence of safely using fuels, chemicals, and compounds.
01.09	Identify and apply electrical-safety procedures.

CTE Standards and Benchmarks	
01.10	Identify the safe use of electrical connectors and cords.
01.11	Demonstrate, apply, and provide evidence of safely using electrical connectors and cords.
01.12	Identify and apply fire-safety precautions.
01.13	Research and identify class A, B, and C type fires.
01.14	Demonstrate and apply the proper procedures for extinguishing class A, B, and C type fires.
01.15	Identify various workplace injuries.
01.16	Demonstrate and practice knowledge of first aid and first response procedures appropriate for this course.
01.17	Identify and apply safety procedures in case of smoke or chemical inhalation.
01.18	Demonstrate and apply material handling techniques to safely move materials.
01.19	Demonstrate and apply proper techniques for lifting loads.
01.20	Research and identify Occupational Safety Health Administration (OSHA) safety standards.
01.21	Demonstrate, apply, and provide evidence of understanding Occupational Safety Health Administration (OSHA) safety standards.
01.22	Locate Material Safety Data Sheets (MSDS).
01.23	Demonstrate understanding and knowledge of using and applying the information located on Material Safety Data Sheets (MSDS).
01.24	Proactively respond to a safety concern and then document occurrences.
01.25	Identify and report unsafe conditions.
01.26	Determine the appropriate corrective action after an unsafe condition is identified.
01.27	Demonstrate knowledge of various emergency alarms and procedures.
01.28	Demonstrate knowledge and apply clean-up procedures for spills.
01.29	Identify and apply procedures for handling hazardous material.
01.30	Perform safety and environmental inspections.
01.31	Perform leak checks to determine if toxic or hazardous material is escaping from a piece of equipment.
01.32	Demonstrate knowledge of proper and safe installation techniques as described in manuals, checklists, and regulations.
01.33	Demonstrate and apply proper equipment shutdown procedures.
01.34	Identify, select, and use personal protective equipment (PPE).
01.35	Identify, demonstrate, and apply ergonomic work techniques.
01.36	Train other students to use and apply safety skills outlined in this standard.

CTE Standards and Benchmarks	
02.0	Demonstrate proficiency in performing pre-delivery maintenance services and set-up procedures--The student will be able to:
02.01	Locate, identify, and interpret manufacturer's identification number information.
02.02	Inspect tires; determine necessary action.
02.03	Identify and describe typical gasoline engine lubricants and lubricant properties.
02.04	Check for proper fluid levels; determine necessary action.
02.05	Check radiator coolant level (if applicable); determine necessary action.
02.06	Check filters; determine necessary action.
02.07	Check accessory circuits; determine necessary action.
02.08	Test and inspect battery; determine necessary action.
02.09	Perform battery state-of-charge test; perform slow/fast battery charge.
02.10	Inspect battery cables, connectors, clamps and hold-downs; determine necessary action.
02.11	Inspect and test fuses; replace as needed.
02.12	Detail engine and prepare unit for delivery.
02.13	Install cables, hoses and electrical assemblies.
02.14	Inspect cables, connectors, clamps and hold-downs; adjust as necessary.
02.15	Check drive-chain tension; determine necessary action
03.0	Demonstrate industry-related math skills--The student will be able to:
03.01	Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
03.02	Perform metric to SAE (and SAE to metric) conversions.
03.03	Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
03.04	Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
04.0	Demonstrate industry-related science skills--The student will be able to:
04.01	Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
04.02	Draw conclusions or make inferences from data.
04.03	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.
04.04	Understand pressure measurement in terms of Pounds per Square Inch (PSI).
05.0	Demonstrate industry-related communication skills--The student will be able to:

CTE Standards and Benchmarks	
	05.01 Draw and interpret hydraulic and mechanical schematics.
	05.02 Correctly write reports.
	05.03 Accurately maintain test logs.
	05.04 Create equipment failure reports.
	05.05 Specify and requisition components.
	05.06 Compose technical letters.
	05.07 Write formal reports of laboratory experiences.
06.0	Demonstrate proficiency in parts inventory identification and repair order processing--The student will be able to:
	06.01 Read and interpret information in parts and service manuals and other technical media.
	06.02 Perform basic parts inventory tracking.
	06.03 Identify and locate parts to service equipment.
	06.04 Write logical and understandable statements, or phrases, to accurately fill out forms, invoices, and work orders.
	06.05 Prepare cost estimates for jobs using service- and flat-rate standards.
	06.06 Interpret and verify customer concerns; determine needed repairs.
	06.07 Answer and ask questions coherently, concisely, and professionally.
	06.08 Read and follow written and oral instructions.
07.0	Perform basic fuel and exhaust system service--The student will be able to:
	07.01 Service air filters; determine necessary action.
	07.02 Inspect exhaust system, mufflers, and heat shields; determine necessary action.
	07.03 Service fuel filters; determine necessary action.
	07.04 Inspect fuel tank and fuel cap; inspect fuel lines, fittings, and hoses; determine necessary action.
	07.05 Determine and use correct fuel and fuel mixtures.
	07.06 Check fuel for contaminants and quality; determine necessary action.
08.0	Perform basic engine service and minor repairs--The student will be able to:
	08.01 Identify and demonstrate knowledge of types of engines.
	08.02 Identify and demonstrate knowledge of engine assemblies and systems.
	08.03 Service crankcase breathers.

CTE Standards and Benchmarks	
	08.04 Identify types and ratios of two-cycle mix oils and their application to specific types of equipment.
	08.05 Remove and inspect spark plug(s); determine necessary action.
	08.06 Inspect and test fusible links and fuses; replace as needed.
09.0	Perform basic tune-up service--The student will be able to:
	09.01 Drain and refill oil, if applicable.
	09.02 Remove and replace spark plug(s).
	09.03 Service filters and breathers.
	09.04 Adjust ignition systems timing.
	09.05 Inspect and service power transfer system.
	09.06 Adjust valves.
10.0	Perform power transfer system service and engine controls adjustments--The student will be able to:
	10.01 Inspect and measure drive belts and chains; determine necessary action.
	10.02 Install drive belts and chains.
	10.03 Identify power transfer system components.
	10.04 Replace drive components.
	10.05 Remove, repair, and reinstall clutches.
	10.06 Sharpen and balance blades.
	10.07 Remove and replace or install blades correctly.
11.0	Service and repair lubrication systems--The student will be able to:
	11.01 Service seals and gaskets; determine necessary action.
	11.02 Identify lubrication systems.
	11.03 Service and repair lubrication systems.
12.0	Diagnose, service, repair and adjust electrical systems--The student will be able to:
	12.01 Understand and demonstrate knowledge of basic electricity and electronics.
	12.02 Identify basic electricity and electronic symbols.
	12.03 Read, interpret, and identify circuit components using a schematic.
	12.04 Draw and interpret electrical/electronic schematics.

CTE Standards and Benchmarks	
12.05	Identify and demonstrate knowledge of a basic series, parallel, and combination circuits.
12.06	Set up and properly use analog or digital multimeters, voltmeters, ammeters, and ohmmeters.
12.07	Identify ignition systems and components.
12.08	Replace electrical system components.
12.09	Identify and test batteries.
12.10	Service batteries according to manufacturer's specifications.
12.11	Service, repair and adjust charging systems.
12.12	Use proper troubleshooting techniques to measure, identify, and diagnose electrical problems.
12.13	Use wiring diagrams during diagnosis of electrical circuit problems.
12.14	Identify damaged wire and electrical harnesses; determine necessary action.
12.15	Locate opens, shorts, grounds, and resistance problems; determine necessary action.
13.0	Service and repair cooling and exhaust systems--The student will
13.01	Service air cooling fins and screens.
13.02	Service two-cycle exhaust systems.
13.03	Service four-cycle exhaust systems.
14.0	Service and repair starting systems--The student will be able to:
14.01	Service and repair manual starting systems.
14.02	Service and repair electrical starting systems.
14.03	Test and service battery starting systems.
15.0	Diagnose and repair ignition systems--The student will be able to:
15.01	Identify and diagnose ignition systems and components.
15.02	Diagnose and repair magneto ignition systems.
15.03	Diagnose and repair solid-state ignition systems.
15.04	Diagnose and repair battery ignition systems.
15.05	Diagnose and repair impulse ignition systems.
15.06	Diagnose and repair electronically controlled fuel injection systems.
16.0	Service, repair and adjust engine controls--The student will be able to:

CTE Standards and Benchmarks	
16.01	Service, repair and adjust governor speed controls.
16.02	Service, repair and adjust remote speed controls.
16.03	Service, repair and adjust manual start-stop controls.
16.04	Service, repair and adjust electrical start-stop controls.
16.05	Service, repair and adjust zone systems.
16.06	Service, repair and adjust blade clutch controls.
16.07	Service, repair and adjust chain brake systems.
16.08	Comply with the Consumer Protection Act (CPA) for three-second stops.
16.09	Comply with the CPA for interlocks.
16.10	Comply with the CPA for blade tip speed.
16.11	Read and interpret CPA rules and regulations.
17.0	Understand basic two-stroke and four-stroke engines--The student will be able to:
17.01	Explain the basic principles of the operation of two-stroke cycle internal combustion engines.
17.02	Identify types of two-stroke cycle engines.
17.03	Explain the basic principles of the operation of four-stroke cycle internal combustion engines.
17.04	Identify types of four-stroke cycle engines.
17.05	Locate engine serial and model numbers.
17.06	Identify engine assemblies and systems.

Florida Department of Education
Student Performance Standards

Course Number: SER0081
Occupational Completion Point: B
Power Equipment Service Technician 2 – 300 Hours – SOC Code 49-3053

Course Description:
The Power Equipment Service Technician 2 course prepares students for entry into Power Equipment Service Technician 3. Students will learn entry-level skills for entry into the outdoor power equipment and other small engine mechanical industries. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of two-stroke and four-stroke cycle engines; engine interior components; power transfer systems; industry-related power and equipment; employability skills; acceptable employee behavior; and entrepreneurship.

For every task in Power Equipment Service Technician 2, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

CTE Standards and Benchmarks	
18.0	Demonstrate proficiency in repairing and maintaining two-stroke cycle engines--The student will be able to:
18.01	Explain the basic principles of the operation of two-stroke cycle internal combustion engines.
18.02	Identify types of two-stroke cycle engines.
18.03	Locate engine serial and model numbers.
18.04	Identify engine assemblies and systems.
18.05	Disassemble engines and inspect parts.
18.06	Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
18.07	Diagnose powerhead problems by use of the visual inspection method.
18.08	Diagnose powerhead problems by use of the compression tester method.
18.09	Diagnose powerhead problems by use of the stethoscope method.
18.10	Remove, clean and inspect piston and rod assemblies.
18.11	Measure out-of-round of pistons and cylinders.
18.12	Hone cylinders.

CTE Standards and Benchmarks	
18.13	Check the total bearing surface of connecting rod bearings.
18.14	Measure piston skirts and ring grooves.
18.15	Measure the piston ring gap in cylinder bores.
18.16	Install piston pins according to manufacturer's specifications.
18.17	Check rod and piston assembly alignment.
18.18	Install rings on pistons.
18.19	Install piston rod assemblies.
18.20	Measure and check crankshafts with a micrometer.
18.21	Check needle bearings.
18.22	Inspect crankshafts and install seal.
18.23	Inspect, clean and/or replace reed valves.
18.24	Reassemble engines.
19.0	Demonstrate proficiency in repairing and maintaining basic four-stroke cycle engines--The student will be able to:
19.01	Explain the basic principles of the operation of four-stroke cycle internal combustion engines.
19.02	Identify types of four-stroke cycle engines.
19.03	Locate engine serial and model numbers.
19.04	Identify engine assemblies and systems.
19.05	Diagnose valve and head problems by use of the visual inspection method.
19.06	Diagnose valve and head problems by use of the compression tester and Leak Down tester method.
19.07	Disassemble engines and inspect parts.
19.08	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
19.09	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
19.10	Adjust valves.
19.11	Remove and inspect camshafts and lifters.
19.12	Clean and inspect lifters for wear.
19.13	Time valve drive assemblies.
19.14	Remove pistons from rod assemblies.

CTE Standards and Benchmarks	
19.15	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
19.16	Check piston pins and bosses for wear.
19.17	Measure piston ring lands width, out-of-round and taper.
19.18	Measure the piston ring gap in cylinder bores.
19.19	Install and fit piston pins.
19.20	Check rod and piston assembly alignment.
19.21	Remove and replace rod bearings.
19.22	Hone and clean cylinders.
19.23	Install rings on pistons.
19.24	Measure and check crankshafts with a micrometer.
19.25	Check for end play.
19.26	Check bearing bores with a telescoping gage.
19.27	Reassemble engines.
19.28	Install oil seals.
19.29	Inspect/replace timing belt/chain.
19.30	After rebuild, final Compression Test and Lead Down Test.
20.0	Demonstrate proficiency in repairing engine interior components--The student will be able to:
20.01	Service, repair and adjust valve systems.
20.02	Service, repair and adjust rings, bores and pistons.
20.03	Service, repair and adjust crankshafts and bearings.
20.04	Service, repair and adjust rods.
20.05	Service, repair and adjust lubrication systems.
20.06	Service, repair and adjust internal governor.
20.07	Service, repair and adjust internal components timing.
20.08	Assemble complete engines to manufacturer's specifications.
20.09	Diagnose causes of component failures to determine if they are due to friction, resulting from poor lubrication or contaminated fuel or to normal wear.
21.0	Demonstrate proficiency in diagnosing and repairing power transfer systems--The student will be able to:

CTE Standards and Benchmarks	
	21.01 Diagnose and replace power transfer system components.
	21.02 Diagnose and repair manual transmissions.
	21.03 Diagnose and repair differentials.
	21.04 Diagnose and replace drive components.
	21.05 Remove and replace hydraulic pump systems.
22.0	Demonstrate proficiency in servicing, repairing, and adjusting various types of industry-related power and equipment--The student will be able to:
	22.01 Service, repair and adjust lawn and garden equipment.
	22.02 Service, repair and adjust commercial golf course equipment.
	22.03 Service, repair and adjust commercial industrial equipment.
	22.04 Service, repair and adjust various industry-related power and equipment.
23.0	Demonstrate employability skills--The student will be able to:
	23.01 Conduct a job search using periodicals and the internet.
	23.02 Secure information about a job.
	23.03 Identify documents that may be required when applying for a job interview.
	23.04 Complete a job application form correctly.
	23.05 Demonstrate competence in job interview techniques.
	23.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
	23.07 Identify acceptable work habits.
	23.08 Demonstrate knowledge of how to make appropriate job changes.
	23.09 Demonstrate acceptable employee health habits.
	23.10 Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200).
24.0	Demonstrate proficiency in acceptable employee behavior--The student will be able to:
	24.01 Explain the effects of chemical/substance abuse.
	24.02 Identify principles of stress management.
	24.03 Identify and define career opportunities in the industry.
	24.04 Explain and identify acceptable work ethics.
	24.05 Explain acceptable dress standards.

CTE Standards and Benchmarks	
	24.06 Identify and demonstrate proper customer relations skills.
	24.07 Identify principles of time management.
	24.08 Identify and define payroll deductions (taxes, insurance, and social security) and employee benefits.
25.0	Demonstrate an understanding of entrepreneurship--The student will be able to:
	25.01 Define entrepreneurship.
	25.02 Describe the importance of entrepreneurship to the American economy.
	25.03 List the advantages and disadvantages of business ownership.
	25.04 Identify and explain the risks involved in ownership of a business.
	25.05 Identify and explain the necessary personal characteristics of a successful entrepreneur.
	25.06 Identify and explain the business skills needed to operate a small business efficiently and effectively.
	25.07 Identify and explain the various types of business structures, e.g. sole proprietor, S-Corporation, etc.

Florida Department of Education
Student Performance Standards

Course Number: SER0082
Occupational Completion Point: C
Power Equipment Service Technician 3 – 300 Hours – SOC Code 49-3053

Course Description:
The Power Equipment Service Technician 3 course prepares students for entry into the outdoor and power equipment technology industry. Students will learn entry-level skills for entry into the outdoor power equipment and other small engine mechanical industries. Hands-on training combined with laboratory and classroom experiences gives the student a full understanding of portable generators; and basic principles of electronic fuel management systems.

For every task in Power Equipment Service Technician 3, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

CTE Standards and Benchmarks	
26.0	Diagnose, service, repair and adjust portable generators.
26.01	Identify generator components and system rotor assembly, stator, circuit breakers, transformers, relays, transistors, brush and brush holder, and voltage regulator.
26.02	Diagnose and service generator systems using revolving field excitation methods, direct excitation, brushless excitation method, field boost assembly, power factor, and oil pressure switch on GN engines.
26.03	Identify and diagnose typical automatic idle control system, troubleshooting idle control, and troubleshooting flow chart for direct excited (brush type generators)
26.04	Troubleshoot brush type generators using industry recognized troubleshooting flowcharts.
26.05	Troubleshoot brushless type generators using industry recognized troubleshooting flowcharts.
27.0	Demonstrate and identify basic principles of electronic fuel management (EFI) systems.
27.01	Diagnose and service fuel pump, module and left pump.
27.02	Diagnose and service fuel filter, high pressure lines, and fuel pressure gauge.
27.03	Diagnose and service (injector pop off tool) fuel injector.
27.04	Diagnose and service electronic control unit (ECU).
27.05	Diagnose and service engine oil temperature sensor.

CTE Standards and Benchmarks	
27.06	Diagnose and service throttle control sensor.
27.07	Troubleshoot malfunction indicator light (MIL) air intake temperature sensor.
27.08	Troubleshoot, read and interpret wiring harness EFT diagram 6 terminal connectors.
27.09	Troubleshoot, diagnose, and service using EFI diagnostic flow diagram flowchart.
27.10	Troubleshoot, diagnose, and service using industry recognized EFI system flowchart.
27.11	Diagnose and service oxygen sensor.

Additional Information

Laboratory Activities

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

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary

education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Marine Service Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

NOTE: This program has been **daggered for deletion** with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, **no new students may be enrolled** in this program. Students already enrolled in the program may, at the District or Institution discretion, continue taking courses in the program until completion. The replacement enrollment option for students is the Marine Service Technologies (T400210) PSAV course.

PSAV – Career Preparatory	
Program Number	T500100
CIP Number	0647061605
Grade Level	30,31
Standard Length	600 hours
Teacher Certification	DIESEL MECH @7 7G GASENG RPR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051 – Motorboat Mechanics and Service Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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 hours	49-3051
B	MTE0050	Outboard Engine Technician 1	300 hours	49-3051

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Perform gasket/seal operations and electronic test skills to industry standards.
14.0 Maintain and repair basic two stroke cycle outboard engines.
15.0 Maintain and repair outboard fuel systems.
16.0 Maintain and repair outboard cooling systems.
17.0 Maintain and repair outboard lubrication systems.
18.0 Maintain and repair outboard lower gear cases.

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

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, high performance related equipment, and fuel systems.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
	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.)

CTE Standards and Benchmarks	
	05.06 Locate and identify fuel pumps and test the vacuum and pressure.
	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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks
12.03 Identify and locate components of lubrication systems.

Florida Department of Education
Student Performance Standards

Course Number: MTE0050
Occupational Completion Point: B
Outboard Engine Technician 1 – 300 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
13.0	Perform gasket/seal operations and electronic test equipment skills to industry standards--The student will be able to:
13.01	Identify and make gaskets and seals.
13.02	Demonstrate appropriate skills in computerized test equipment.
14.0	Maintain and repair basic two-stroke cycle outboard engines--The student will be able to:
14.01	Disassemble engines.
14.02	Remove, clean and inspect heads for cracks, warpage and damaged spark plug threads.
14.03	Diagnose head problems by use of the visual inspection method.
14.04	Diagnose head problems by use of the compression tester method.
14.05	Diagnose head problems by use of cylinder air pressure method.
14.06	Diagnose head problems by use of the stethoscope method.
14.07	Remove, clean and inspect piston rods and assemblies.
14.08	Measure out-of-round of pistons and cylinders.
14.09	Hone cylinders.
14.10	Check the total bearing surface of connecting rod bearings.
14.11	Measure piston skirts and ring grooves.
14.12	Measure the piston ring gap in cylinder bores.
14.13	Install piston pins according to manufacturer's specifications.
14.14	Check rod and piston assembly alignment.
14.15	Install rings on pistons.

CTE Standards and Benchmarks	
	14.16 Install piston rod assemblies.
	14.17 Measure and check crankshafts with a micrometer.
	14.18 Check needle bearings.
	14.19 Inspect crankshafts and install seal.
	14.20 Inspect, clean and/or replace reed valves.
	14.21 Reassemble engines.
15.0	Maintain and repair outboard fuel systems--The student will be able to:
	15.01 Identify the major types of carburetors.
	15.02 Check and adjust throttle and governor linkages.
	15.03 Identify and service different types of EFI systems.
	15.04 Remove, service and replace air cleaners.
	15.05 Diagnose carburetor problems.
16.0	Maintain and repair outboard cooling systems--The student will be able to:
	16.01 Disassemble, examine for problems and reassemble water pumps.
	16.02 Remove, check and replace thermostats.
	16.03 Use thermostat pressure relief systems.
	16.04 Service manifolds and thermostat housings.
17.0	Maintain and repair outboard lubrication systems--The student will be able to:
	17.01 Check engines for oil leaks.
	17.02 Change engine oil and filters.
	17.03 Check engine oil pressure and level.
	17.04 Recognize and use only recommended oil.
	17.05 Inspect and service oil-metering systems.
18.0	Maintain and repair outboard lower gear cases--The student will be able to:
	18.01 Remove and replace lower gear cases.
	18.02 Reshim lower gear cases.
	18.03 Refill lower gear cases with specified oil.
	18.04 Determine propeller pitch diameter and hub type.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Marine Service Technology 2**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

NOTE: This program has been **daggered for deletion** with 2014-2015 being the last cohort of students permitted to enroll in the program. After 2014-2015, **no new students may be enrolled** in this program. Students already enrolled in the program may, at the District or Institution discretion, continue taking courses in the program until completion. The replacement enrollment option for students is the Marine Service Technologies (T400210) PSAV course.

PSAV – Career Preparatory	
Program Number	T500200
CIP Number	0647061606
Grade Level	30,31
Standard Length	750 hours
Teacher Certification	DIESEL MECH @7 7G GASENG RPR @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3051 – Motorboat Mechanics and Service Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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	MTE0070	Outboard Engine Technician 2	300 hours	49-3051
B	MTE0183	Stern Drive Technician	150 hours	49-3051
C	MTE0054	Inboard Gas Technician	150 hours	49-3051
D	MTE0056	Inboard Diesel Technician	150 hours	49-3051

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Maintain and repair basic four-stroke cycle stern drive engines.
09.0 Maintain and repair stern drive fuel systems.
10.0 Maintain and repair stern drive cooling systems.
11.0 Maintain and repair stern drive lubrication systems.
12.0 Maintain and repair stern drive upper gear case.
13.0 Maintain and repair stern drive lower gear case.
14.0 Maintain and repair stern drive battery ignition.
15.0 Maintain and repair stern drive; capacitor discharge ignition system.
16.0 Maintain and repair stern drive intermediate housing.
17.0 Perform parts manual activities to industry standards.
18.0 Maintain and repair basic four-stroke cycle inboard gas engine.
19.0 Maintain and repair inboard fuel systems.
20.0 Maintain and repair inboard gas cooling systems.
21.0 Maintain and repair inboard gas lubrication systems.
22.0 Maintain and repair inboard gas fuel systems.
23.0 Maintain and repair inboard gas transmissions.
24.0 Maintain and repair inboard diesel fuel systems.
25.0 Maintain and repair inboard diesel cooling systems.
26.0 Maintain and repair inboard diesel lubrication systems.
27.0 Maintain and repair inboard diesel charging systems.

Florida Department of Education
Student Performance Standards

Course Number: MTE0070
Occupational Completion Point: A
Outboard Engine Technician 2 – 300 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
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 drive units.
01.07	Bench test switches.
01.08	Bench test minor parts of starting motor components.
01.09	Install, reassemble and test new starter parts.
01.10	Troubleshoot starting systems using battery starter testers.
01.11	Set up and use battery starter (load) testers.
01.12	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.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
	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.

CTE Standards and Benchmarks
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.

Florida Department of Education
Student Performance Standards

Course Number: MTE0183
Occupational Completion Point: B
Stern Drive Technician – 150 Hours – SOC Code 49-3051

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, upper and lower gear case assemblies.

CTE Standards and Benchmarks	
08.0	Maintain and repair basic four-stroke cycle stern drive engines--The student will be able to:
08.01	Diagnose valve and head problems by use of the visual inspection method.
08.02	Diagnose valve and head problems by use of the compression tester method.
08.03	Diagnose valve and head problems by use of the cylinder air pressure method.
08.04	Disassemble engines and inspect parts.
08.05	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
08.06	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
08.07	Check and inspect springs for free height, distortion and installed height.
08.08	Adjust valve lash.
08.09	Move and inspect camshafts and lifters.
08.10	Measure camshafts.
08.11	Clean and inspect lifters for wear.
08.12	Time valve drive assemblies.
08.13	Remove pistons from rod assemblies.
08.14	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
08.15	Check piston pins and bosses for wear.
08.16	Measure piston ring lands width, out-of-round and taper.
08.17	Measure the piston ring gap in cylinder bores.

CTE Standards and Benchmarks	
08.18	Install and fit piston pins.
08.19	Check rod and piston assembly alignment.
08.20	Remove and replace rod bearings.
08.21	Hone and clean cylinders.
08.22	Install rings on pistons.
08.23	Measure and check crankshafts with a micrometer.
08.24	Check for end play.
08.25	Check bearing bores with a telescoping gage.
08.26	Reassemble engines.
08.27	Install oil seals.
09.0	Maintain and repair stern drive fuel systems--The student will be able to:
09.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
09.02	Sketch and label the parts of total fuel systems.
09.03	Service fuel lines.
09.04	Remove, clean and install fuel tanks.
09.05	Identify and locate fuel pump vacuums.
09.06	Remove, replace service and check the pressure of fuel pumps.
09.07	Remove, clean and replace in-line filters.
09.08	Identify the major types of carburetors.
09.09	Check and adjust throttle and governor linkages.
09.10	Identify and service different types of EFI systems.
09.11	Identify and understand different types of evaporative control systems.
10.0	Maintain and repair stern drive cooling systems--The student will be able to:
10.01	Explain the principles of cooling systems, including fresh water cooling systems.
10.02	Trace water flow through cooling systems.
10.03	Disassemble and reassemble water pumps.
10.04	Remove, check and replace thermostats.

CTE Standards and Benchmarks	
	10.05 Use thermostat pressure relief systems.
	10.06 Service manifolds, risers and thermostat housings.
	10.07 Service water-cooling systems for gas inboard.
11.0	Maintain and repair stern drive lubrication systems--The student will be able to:
	11.01 Identify the types and functions of lubrication systems.
	11.02 Explain the principles of lubrication systems.
	11.03 Identify and locate components of lubrication systems.
	11.04 Check engines for oil leaks.
	11.05 Change engine oil and filters.
	11.06 Check engine oil pressure and level.
	11.07 Recognize and use only recommended oil.
12.0	Maintain and repair stern drive upper gear case--The student will be able to:
	12.01 Determine the differences between mechanical, electrical and hydraulic shifting units.
	12.02 Disassemble and reassemble each type of shifting unit.
	12.03 Reshim units to manufacturers' specifications.
	12.04 Use the proper oil to refill upper and lower gear cases.
13.0	Maintain and repair stern drive lower gear cases--The student will be able to:
	13.01 Determine the differences between mechanical, electrical and hydraulic shifting.
	13.02 Remove and replace lower gear cases.
	13.03 Reshim lower gear cases.
	13.04 Refill lower gear cases with specified oil.
	13.05 Determine propeller pitch, diameter and hub type.
14.0	Maintain and repair stern drive battery ignition systems--The student will be able to:
	14.01 Locate and match electrical units by their symbols on a wiring diagram.
	14.02 Sketch and label complete battery ignition systems.
	14.03 Set up and use test equipment.
	14.04 Set timing using a timing light

CTE Standards and Benchmarks	
15.0	Maintain and repair stern drive capacitor discharge ignition systems--The student will be able to:
15.01	Sketch and label electrical symbols.
15.02	Set up and use ohmmeters.
15.03	Set up and use appropriate test equipment.
15.04	Set up and use spark testers.
15.05	Set up and use neon test lights.
15.06	Set up and use low/high ammeters.
15.07	Set up and use voltmeters.
15.08	Locate and identify parts of capacitor discharge ignition systems.
15.09	Locate and match electrical units by their symbols on a wiring diagram.
15.10	Sketch and label complete C/D ignition systems.
15.11	Check coil resistance, shorts and grounds with an ohmmeter.
15.12	Check stator windings with an ohmmeter.
15.13	Check sensor coils, charge coils, ignition coils and shorts to ground with appropriate test equipment.
15.14	Check power packs with an ohmmeter and appropriate test equipment.
16.0	Maintain and repair stern drive intermediate housings--The student will be able to:
16.01	Disassemble main drive shafts.
16.02	Shim drive shafts to intermediate housings.
16.03	Remove and replace clutch assemblies.
16.04	Check electrical components with proper test equipment.
16.05	Remove and replace "U" joints.
16.06	Disassemble outer transom plates.
16.07	Adjust trim and limit switches.
16.08	Disassemble cylinder rams.
16.09	Service and install trim and tilt systems.
16.10	Remove and test cylinder rams.
16.11	Adjust reverse locks.

CTE Standards and Benchmarks
16.12 Adjust the trim and tilt.

Florida Department of Education
Student Performance Standards

Course Number: MTE0054
Occupational Completion Point: C
Inboard Gas Technician – 150 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
17.0	Perform parts manual activities to industry standards--The student will be able to:
17.01	Read and use parts manuals.
18.0	Maintain and repair basic four-stroke cycle inboard gas engines--The student will be able to:
18.01	Diagnose valve and head problems by use of the visual inspection method.
18.02	Diagnose valve and head problems by use of the compression tester method.
18.03	Diagnose valve and head problems by use of the cylinder air pressure method.
18.04	Disassemble engines and inspect parts.
18.05	Clean and inspect heads for cracks, warpage and damaged spark plug threads.
18.06	Inspect valves for warpage, burns, cracks, stem wear, tip wear and margin.
18.07	Check and inspect springs for free height, distortion and installed height.
18.08	Adjust valve lash.
18.09	Remove and inspect camshafts and lifters.
18.10	Measure camshafts.
18.11	Clean and inspect lifters for wear.
18.12	Time valve drive assemblies.
18.13	Remove pistons from rod assemblies.
18.14	Measure out-of-round and cylinder taper with a dial bore gage or micrometer.
18.15	Check piston pins and bosses for wear.
18.16	Measure piston ring lands width, out-of-round and taper.

CTE Standards and Benchmarks	
18.17	Measure the piston ring gap in cylinder bores.
18.18	Install and fit piston pins.
18.19	Check rod and piston assembly alignment.
18.20	Remove and replace rod bearings.
18.21	Hone and clean cylinders.
18.22	Install rings on pistons.
18.23	Measure and check crankshafts with a micrometer.
18.24	Check for end play.
18.25	Check bearing bores with a telescoping gage.
18.26	Reassemble engines.
18.27	Install oil seals.
19.0	Maintain and repair inboard fuel systems--The student will be able to:
19.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
19.02	Sketch and label the parts of total fuel systems.
19.03	Service fuel lines.
19.04	Remove, clean and install fuel tanks.
19.05	Identify and locate fuel pump vacuums.
19.06	Remove, replace service and check the pressure of fuel pumps.
19.07	Remove, clean and replace in-line filters.
19.08	Identify the major types of carburetors.
19.09	Check and adjust throttle and governor linkages.
19.10	Identify and service different types of EFI systems.
19.11	Identify and understand different types of evaporative control systems.
20.0	Maintain and repair inboard gas cooling systems--The student will be able to:
20.01	Explain the principles of cooling systems, including fresh water cooling systems.
20.02	Trace water flow through cooling systems.
20.03	Disassemble and reassemble water pumps.

CTE Standards and Benchmarks	
	20.04 Remove, check and replace thermostats.
	20.05 Use thermostat pressure relief systems.
	20.06 Service manifolds, risers and thermostat housings.
	20.07 Service water-cooling systems for gas inboard, gas outboard and diesel engines.
21.0	Maintain and repair inboard gas lubrication systems--The student will be able to:
	21.01 Identify the types and functions of lubrication systems.
	21.02 Explain the principles of lubrication systems.
	21.03 Identify and locate components of lubrication systems.
	21.04 Check engines for oil leaks.
	21.05 Change engine oil and filters.
	21.06 Check engine oil pressure and level.
	21.07 Recognize and use only recommended oil.
22.0	Maintain and repair inboard gas fuel systems--The student will be able to:
	22.01 Remove, service and replace carburetor air cleaners/flame arrestors.
	22.02 Identify and locate fuel system components (fuel pumps, carburetors and air filters, linkages and intake manifolds).
	22.03 Remove, clean, overhaul, replace and make final adjustments to carburetors.
23.0	Maintain and repair transmissions--The student will be able to:
	23.01 Inspect planetary clutch plate air coupling assemblies
	23.02 Remove and replace transmissions.
	23.03 Use proper service tools in shimming, reassembly and testing.
	23.04 Drain transmissions.
	23.05 Determine capacity using the transmission service manuals.
	23.06 Refill transmissions according to manufacturers' specifications.

Florida Department of Education
Student Performance Standards

Course Number: MTE0056
Occupational Completion Point: D
Inboard Diesel Technician – 150 Hours – SOC Code 49-3051

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.

CTE Standards and Benchmarks	
24.0	Maintain and repair inboard diesel fuel systems--The student will be able to:
24.01	Identify and locate fuel system components (fuel tanks, lines, filters, etc.).
24.02	Sketch and label the parts of total fuel systems.
24.03	Service fuel lines.
24.04	Remove, clean and install fuel tanks.
24.05	Identify and locate fuel control devices.
24.06	Remove, replace service and check the pressure of fuel pumps.
24.07	Remove, clean and replace in-line filters.
24.08	Check and adjust throttle and governor linkages.
24.09	Check fuel systems for leaks.
24.10	Bleed systems for starting.
24.11	Adjust nozzle pressure to manufacturer's specifications.
24.12	Set the injection pump angle (timing).
24.13	Check or replace glow plugs.
24.14	Check; stop solenoids.
25.0	Maintain and repair inboard diesel cooling systems--The student will be able to:
25.01	Disassemble and reassemble water pumps.
25.02	Remove, check and replace thermostats.
25.03	Use thermostat pressure relief systems.

CTE Standards and Benchmarks	
	25.04 Service manifolds, risers and thermostat housings.
	25.05 Service water-cooling systems for diesel engines.
26.0	Maintain and repair inboard diesel lubrication systems--The student will be able to:
	26.01 Identify the types and functions of lubrication systems.
	26.02 Explain the principles of lubrication systems.
	26.03 Identify and locate components of lubrication systems.
	26.04 Check engines for oil leaks.
	26.05 Change engine oil and filters.
	26.06 Check engine oil pressure and level.
	26.07 Recognize and use only recommended oil.
27.0	Maintain and repair inboard diesel charging systems--The student will be able to:
	27.01 Inspect, remove and replace alternator belts.
	27.02 Check the output of charging systems.
	27.03 Analyze malfunctions.
	27.04 Test and overhaul alternators.
	27.05 Remove and replace regulators.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Advanced Automotive Service Technology 1**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T600100
CIP Number	0647060413
Grade Level	30, 31
Standard Length	800 hours
Teacher Certification	AUTO IND @7 %7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023 – Automotive Service Technicians and Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

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.

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

Program Structure
This program is a planned sequence of instruction consisting of two occupational completion points.

NOTE: It is recommended that students complete **OCP-A (Automotive Maintenance Technician)** and/or demonstrate mastery of the outcomes in **OCP-A (Automotive Maintenance Technician)** prior to enrolling in additional Advanced Automotive Service Technology courses. **The sequence of OCP's, after completing and/or demonstrating mastery of OCP-A (Automotive Maintenance Technician), is at the discretion of the instructor.**

For institutions using this framework, the National Automotive Technicians Education Foundation (NATEF) highly recommends the Master Automotive Service Technology (MAST) program Certification/Accreditation. Florida Statute (F.S.) 1004.925 – Automotive service technology education programs; certification. – requires all automotive service technology education programs shall be industry certified in accordance with rules adopted by the State Board of Education.

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

When offered at the postsecondary 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 **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0011	Automotive Maintenance Technician	400 hours	49-3023
B	AER0319	Advanced Automotive Electrical/Electronic System Technician	400 hours	49-3023

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Advanced Automotive Service Technology program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry.
02.0 Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry.
03.0 Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services.
04.0 Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems.

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

Course Description:
The Automotive Maintenance Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study shop and personal safety skills, tools and equipment, pre/post maintenance, and customer service.

Abbreviations:
ASE = Required Supplemental Tasks

For every task in Automotive Maintenance Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

CTE Standards and Benchmarks		Priority Number
01.0	Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry --The student will be able to:	
01.01	Identify and apply general shop safety rules and procedures, EPA and OSHA standards	ASE
01.02	Identify and use appropriate emergency first aid procedures.	
01.03	Identify and use proper placement of floor jacks and jack stands.	ASE
01.04	Identify and use proper procedures for safe lift operation.	ASE
01.05	Utilize proper ventilation procedures for working within the lab/shop area.	ASE
01.06	Identify and use proper procedures for safe pit usage.	
01.07	Identify marked safety areas.	ASE
01.08	Identify the location and the types of fire extinguishers and other fire safety equipment.	ASE
01.09	Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment.	ASE

CTE Standards and Benchmarks		Priority Number
01.10	Identify the location and use of eye wash stations.	ASE
01.11	Identify the location of the posted evacuation routes.	ASE
01.12	Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	ASE
01.13	Secure hair and jewelry for lab/shop activities.	ASE
01.14	Use proper handling procedures for automotive fluids.	
01.15	Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.	
01.16	Identify and wear appropriate clothing for lab/shop activities.	ASE
01.17	Identify and describe typical automotive lubricants and lubricant properties.	
01.18	Research, identify, and interpret the Federal 'Workers Right To Know Law'.	
01.19	Identify and describe typical automotive seals and gaskets.	
01.20	Explain the effects of chemical/substance abuse.	
01.21	Identify principles of stress management.	
01.22	Identify and define career opportunities in the automotive service industry.	
01.23	Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)	ASE
01.24	Locate and demonstrate knowledge of material safety data sheets (MSDS).	ASE
01.25	Demonstrate knowledge of the Automotive Service Excellence (ASE) Certification and other applicable certifications.	
01.26	Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	ASE
01.27	Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.	
02.0	Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry --The student will be able to:	
02.01	Utilize and demonstrate safe procedures for handling of tools and equipment.	ASE
02.02	Identify and use standard and metric measurement skills and designation.	ASE
02.03	Identify tools and equipment and their appropriate usage in automotive applications.	ASE
02.04	Demonstrate proper use of precision-measuring tools (i.e. micrometer, digital/dial-indicator, digital/dial-caliper) and torque methods.	ASE
02.05	Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	ASE
02.06	Identify and use the proper procedures required for cutting tubing and double and ISO flaring.	

CTE Standards and Benchmarks		Priority Number
03.0	Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services --The student will be able to:	
03.01	Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.	
03.02	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).	
03.03	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	ASE
03.04	Review vehicle service history.	ASE
03.05	Identify information needed and the service requested on a repair order.	ASE
03.06	Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.	ASE
03.07	Demonstrate use of the three C's (Concern, Cause, and Correction).	ASE
03.08	Use computer and operate keyboard to perform tasks typically required at a dealership.	
03.09	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).	ASE
03.10	Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.	
03.11	Document observed damage, unusual conditions, and concerns.	
03.12	Demonstrate retrieving stored diagnostic trouble codes.	
03.13	Reset product specific service indicator.	
03.14	Identify acceptable customer relations.	
03.15	Identify and demonstrate proper customer relations skills.	
03.16	Identify and define payroll deductions (taxes, insurance, social security) employee benefits and pay systems.	
03.17	Identify principles of time management.	
03.18	Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.	
03.19	Locate and use technical service bulletins (TSBs).	
03.20	Use proper chemicals for cleaning and lubrication.	
03.21	Determine the presence of a Tire Pressure Monitoring System (TPMS).	
03.22	Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).	
03.23	Determine the presence of wheel locks.	
03.24	Determine the presence of an air suspension system.	

CTE Standards and Benchmarks	Priority Number
03.25 Check operation and status of instrument panel warning lights and gauges.	
03.26 Inspect underhood area for leaks, damage, and unusual conditions.	
03.27 Inspect undercar area for leaks, damage, and unusual conditions.	
03.28 Inspect engine assembly for fuel, oil, coolant, and other leaks.	
03.29 Determine fluid type requirements and identify fluid.	
03.30 Check engine oil level and condition; service as required.	
03.31 Change engine oil and filter.	
03.32 Check engine coolant level and condition; service as required.	
03.33 Inspect cooling system pipes and hoses for wear, damage, and proper routing.	
03.34 Inspect manual and power steering fluid levels and condition; service as required.	
03.35 Lubricate driveline, suspension and steering systems.	
03.36 Inspect and replace power steering hoses and fittings.	
03.37 Inspect struts, springs, and related components; service as required.	
03.38 Inspect stabilizer bar, bushings, brackets, and links; service as required.	
03.39 Inspect springs, torsion bars, and related components; service as required.	
03.40 Inspect, remove, and replace shock absorbers.	
03.41 Check windshield washer fluid level and condition; service as required.	
03.42 Check automatic transmission fluid level and condition; service as required.	
03.43 Check differential/transfer case fluid level; note unusual conditions; service as required.	
03.44 Check manual transmission fluid level; note unusual conditions; service as required.	
03.45 Service transmission; perform visual inspection; replace fluids and filters.	
03.46 Check hydraulic clutch fluid and condition; service as required.	
03.47 Check rear axle drive assembly seals and vents; check lube level.	
03.48 Inspect constant velocity (CV) axle shaft boots; service as required.	
03.49 Remove, inspect, and service front and rear wheel bearings on non-drive axles.	
03.50 Check wheel bearings for play and other signs of wear.	
03.51 Inspect, replace and adjust drive belts; inspect tensioners and pulleys.	

CTE Standards and Benchmarks		Priority Number
03.52	Inspect and replace air filter.	
03.53	Inspect and replace cabin air filter.	
03.54	Inspect tires, diagnose tire wear patterns, inspect spare and mounting system; check and adjust tire pressure.	
03.55	Rotate tires according to manufacturer's recommendations; install wheels, torque lug nuts.	
03.56	Balance wheel and tire assembly (static and dynamic).	
03.57	Dismount, inspect, repair, and remount tire on wheel.	
03.58	Repair tire according to industry standards.	
03.59	Identify nitrogen-filled tires.	
03.60	Reinstall wheel; torque wheel fasteners to specification.	
03.61	Perform a visual inspection of a brake drum system.	
03.62	Perform a visual inspection of a disc brake system.	
03.63	Check parking brake operation; check parking brake components for unusual conditions.	
03.64	Check master cylinder for internal and external leaks and proper operation.	
03.65	Fill master cylinder with recommended fluid and seat pads.	
03.66	Select, handle, store, and install brake fluids to proper level.	
03.67	Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports.	
03.68	Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; tighten loose fittings and supports.	
03.69	Inspect fuel tank, fuel cap and seal; inspect and replace fuel lines, fittings, and hoses.	
03.70	Inspect and replace fuel filters as applicable.	
03.71	Inspect exhaust manifold, exhaust pipes, mufflers, resonators, tail pipes, and heat shields; repair or replace as needed.	
03.72	Inspect, test head lamps, tail lamps and stop lamps. Aim headlights.	
03.73	Inspect and replace exterior and courtesy lamps.	
03.74	Check wiper blades, inserts, and arms; replace wiper blades or inserts.	
03.75	Lubricate door latches and hinges.	
03.76	Perform slow/fast battery charge.	
03.77	Inspect, clean, fill, and replace battery.	
03.78	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.	

CTE Standards and Benchmarks		Priority Number
03.79	Perform battery, starting, and charging system tests using appropriate tester.	
03.80	Perform battery capacity (load, high-rate discharge) test; determine needed service.	
03.81	Start a vehicle using jumper cables using a battery auxiliary power supply.	
03.82	Measure and diagnose the cause(s) of abnormal key-off battery drain.	
03.83	Perform starter current draw and circuit voltage drop test; determine necessary action.	
03.84	Remove and replace/reinstall starter.	
03.85	Remove, inspect, and replace/reinstall alternator.	
03.86	Observe dash warning lamps during bulb check.	
03.87	Practice recommended precautions when handling static sensitive devices.	
03.88	Check 12 volt non-computer electrical circuits with a test light; determine necessary action.	
03.89	Check voltage and voltage drop in electrical circuits using a digital multimeter (DMM).	
03.90	Obtain and interpret digital multimeter (DMM) readings.	
03.91	Check current flow in electrical/electronic circuits and components using an ammeter.	
03.92	Check electrical circuits using jumper wires.	
03.93	Inspect and test fusible links, circuit breakers, and fuses; confirm proper circuit operation; replace as needed.	
03.94	Maintain or restore electronic memory functions if required.	
03.95	Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; service or replace as needed.	
03.96	Adjust valves on engines with mechanical lifters.	
03.97	Remove and replace valve cover gaskets.	
03.98	Return cores for rebuilt and exchange items.	
03.99	Inspect driver and passenger restraint system, repair if needed.	
03.100	Demonstrate knowledge of manufacturer policies and procedures.	
03.101	Perform product specific service procedures.	
03.102	Identify and maintain product specific engine systems.	
03.103	Identify and maintain product specific automatic transmission systems.	
03.104	Identify and maintain product specific manual transmission systems.	
03.105	Identify and maintain product specific electrical and electronic systems.	

CTE Standards and Benchmarks	Priority Number
03.106 Identify and maintain product specific heating and A/C systems.	
03.107 Identify and maintain product specific steering and suspension systems.	
03.108 Identify and maintain product specific brake systems.	
03.109 Identify and maintain product specific audio systems.	
03.110 Identify and maintain product specific safety systems.	
03.111 Identify and maintain product specific accessories.	

Florida Department of Education
Student Performance Standards

Course Number: AER0319
Occupational Completion Point: B
Advanced Automotive Electrical/Electronic System Technician – 400 Hours – SOC Code 49-3023

Course Description:
The Advanced Automotive Electrical/Electronic System Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems diagnostics, service, and repair.

Abbreviations:
EE = Electrical/Electronic Systems

For every task in Advanced Automotive Electrical/Electronic System Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

EE Task List:	
P-1	**= 36**
P-2	**= 14**
P-3	**= 8**
Total	**58**

CTE Standards and Benchmarks		Priority Number
04.0	Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems-- The student will be able to:	
04.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
04.02	Identify and interpret electrical/electronic system concern; determine necessary action.	
04.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
04.04	Locate and interpret vehicle and major component identification numbers.	
04.05	Diagnose and demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1
04.06	Use wiring diagrams during diagnosis (troubleshooting) of electrical/electronic circuit problems.	P-1
04.07	Demonstrate the proper use of a digital multimeter (DMM) when measuring source, voltage drop (including grounds), current flow, and resistance.	P-1
04.08	Check operation of electrical circuits with a test light.	P-1

CTE Standards and Benchmarks		Priority Number
04.09	Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.	P-2
04.10	Check operation of electrical circuits using fused jumper wires.	P-1
04.11	Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-1
04.12	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.	P-1
04.13	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	P-1
04.14	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.	P-1
04.15	Replace electrical connectors and terminal ends.	P-1
04.16	Repair wiring harness.	P-1
04.17	Perform solder repair of electrical wiring.	P-1
04.18	Repair CAN/BUS wiring harness.	P-1
04.19	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.	
04.20	Perform battery state-of-charge test; determine necessary action.	P-1
04.21	Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.	P-1
04.22	Maintain or restore electronic memory functions.	P-1
04.23	Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.	P-1
04.24	Perform slow/fast battery charge according to manufacturer’s recommendations.	P-1
04.25	Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.	P-1
04.26	Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.	P-3
04.27	Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.	P-1
04.28	Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	P-3
04.29	Perform battery conductance test; determine necessary action.	
04.30	Perform starter current draw tests; determine necessary action.	P-1
04.31	Perform starter circuit voltage drop tests; determine necessary action.	P-1
04.32	Inspect and test starter relays and solenoids; determine necessary action.	P-2
04.33	Remove and install starter in a vehicle.	P-1

CTE Standards and Benchmarks		Priority Number
04.34	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	P-2
04.35	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	P-2
04.36	Perform charging system output test; determine necessary action.	P-1
04.37	Diagnose (troubleshoot) charging system for the cause of undercharge, no-charge, and overcharge conditions.	P-1
04.38	Inspect, adjust, or replace generator (alternator) drive belts, check pulleys, and tensioners for wear; check pulley and belt alignment.	P-1
04.39	Remove, inspect, and re-install generator (alternator).	P-1
04.40	Perform charging circuit voltage drop test; determine necessary action.	P-1
04.41	Diagnose (troubleshoot) the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	P-1
04.42	Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving light); replace as needed.	P-1
04.43	Aim headlights.	P-2
04.44	Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.	
04.45	Identify system voltage and safety precautions associated with high intensity discharge headlights.	P-2
04.46	Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.	P-2
04.47	Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.	
04.48	Diagnose (troubleshoot) the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	P-2
04.49	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.	
04.50	Diagnose (troubleshoot) causes of incorrect horn operation; perform necessary action.	P-1
04.51	Diagnose (troubleshoot) causes of incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	P-2
04.52	Diagnose (troubleshoot) windshield washer problems; perform necessary action.	P-2
04.53	Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.	P-2
04.54	Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.	
04.55	Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.	P-2
04.56	Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action	P-3
04.57	Diagnose (troubleshoot) supplemental restraint system (SRS) concerns; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
04.58	Disable and enable an airbag system for vehicle service; verify indicator lamp operation.	P-1
04.59	Diagnose (troubleshoot) radio static and weak, intermittent, or no radio reception; determine necessary action.	P-3
04.60	Remove and reinstall door panel.	P-1
04.61	Diagnose (troubleshoot) body electronic system circuits using a scan tool; determine necessary action.	P-3
04.62	Check for module communication (including CAN/BUS systems) using a scan tool.	P-2
04.63	Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems.	P-3
04.64	Describe the operation of keyless entry/remote-start systems.	P-3
04.65	Verify operation of instrument panel gauges and warning /indicator lights; reset maintenance indicator.	P-1
04.66	Verify windshield wiper and washer operation, replace wiper blades.	P-1
04.67	Describe the process for software transfers, software updates, or flash reprogramming on electronic modules.	P-3
04.68	Service and repair product specific electrical/electronic systems.	
04.69	Perform product specific diagnostic procedures.	

Additional Information

Laboratory Activities

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

Special Notes

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Advanced Automotive Service Technology 2**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T600200
CIP Number	0647060414
Grade Level	30, 31
Standard Length	1600 hours
Teacher Certification	AUTO IND @7 %7G AUTO MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3023 – Automotive Service Technicians and Mechanics
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

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.

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

Program Structure
This program is a planned sequence of instruction consisting of seven occupational completion points.

NOTE: It is recommended that students complete **OCP-A (Automotive Maintenance Technician) of Advanced Automotive Service Technology 1** and/or demonstrate mastery of the outcomes in **OCP-A (Automotive Maintenance Technician) of Advanced Automotive Service Technology 1** prior to enrolling in additional Advanced Automotive Service Technology courses. **The sequence of OCP's, after completing and/or demonstrating mastery of OCP-A (Automotive Maintenance Technician) of Advanced Automotive Service Technology 1, is at the discretion of the instructor.**

For institutions using this framework, the National Automotive Technicians Education Foundation (NATEF) highly recommends the Master Automotive Service Technology (MAST) program Certification/Accreditation. Florida Statute (F.S.) 1004.925 – Automotive service technology education programs; certification. – requires all automotive service technology education programs shall be industry certified in accordance with rules adopted by the State Board of Education.

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

When offered at the postsecondary 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 **PSAV** program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	AER0118	Advanced Engine Repair Technician	200 hours	49-3023
B	AER0258	Advanced Automatic Transmission and Transaxle Technician	200 hours	49-3023
C	AER0275	Advanced Manual Drivetrain and Axle Technician	200 hours	49-3023
D	AER0459	Advanced Automotive Suspension and Steering Technician	200 hours	49-3023
E	AER0419	Advanced Automotive Brake System Technician	200 hours	49-3023
F	AER0173	Advanced Automotive Heating and Air Conditioning Technician	200 hours	49-3023
G	AER0506	Advanced Automotive Engine Performance Technician	400 hours	49-3023

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Advanced Automotive Service Technology program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Explain and apply proficiently engine theory, diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems
02.0 Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles.
03.0 Explain and apply proficiently the operation, assembly, diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive.
04.0 Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires.
05.0 Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems.
06.0 Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling.
07.0 Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems.

Florida Department of Education
Student Performance Standards

Program Title: **Advanced Automotive Technology 2**
PSAV Number: **I470604**

Course Number: AER0018
Occupational Completion Point: A
Advanced Engine Repair Technician – 200 Hours – SOC Code 49-3023

Course Description:
The Advanced Engine Repair Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study engine theory and repair, cylinder heads, valve trains, engine blocks, lubrication, and cooling systems.

Abbreviations:
ER = Engine Repair

For every task in Advanced Engine Repair Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

ER Task List:	
P-1	**23**
P-2	**17**
P-3	**11**
Total	**51**

CTE Standards and Benchmarks		Priority Number
01.0	Explain and apply proficiently engine theory, diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems --The student will be able to:	
01.01	Service product specific engine systems.	
01.02	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1
01.03	Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.	P-1
01.04	Verify operation of the instrument panel engine warning indicator.	P-1
01.05	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	P-1
01.06	Remove and replace timing belt; verify correct camshaft timing.	P-1
01.07	Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.	P-3

CTE Standards and Benchmarks		Priority Number
01.08	Install engine covers using gaskets, seals and sealers as required.	P-1
01.09	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
01.10	Inspect, remove and replace engine mounts.	P-2
01.11	Identify hybrid vehicle internal combustion engine service precautions.	P-3
01.12	Diagnose engine noises and vibrations; determine necessary action.	
01.13	Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action.	
01.14	Perform engine vacuum tests; determine necessary action.	
01.15	Locate and interpret vehicle and major component identification numbers.	
01.16	Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.	P-1
01.17	Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.	P-1
01.18	Inspect valve springs for squareness and free height comparison; determine necessary action.	P-3
01.19	Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action.	P-3
01.20	Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.	P-3
01.21	Inspect valves and valve seats; determine necessary action.	P-3
01.22	Check valve spring assembled height and valve stem height; determine necessary action.	P-3
01.23	Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.	P-2
01.24	Inspect valve lifters; determine necessary action.	P-2
01.25	Adjust valves (mechanical or hydraulic lifters).	P-1
01.26	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 valve timing components; verify correct camshaft timing.	P-1
01.27	Inspect and/or measure camshaft for run out, journal wear and lobe wear.	P-2
01.28	Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.	P-3
01.29	Establish camshaft position sensor indexing.	P-1
01.30	Service product specific cam drive systems.	
01.31	Perform product specific valve adjustments.	

CTE Standards and Benchmarks		Priority Number
01.32	Perform cylinder power balance tests; determine necessary action.	
01.33	Perform cylinder cranking and running compression tests; determine necessary action.	
01.34	Perform cylinder leakage tests; determine necessary action.	
01.35	Remove, inspect, or replace crankshaft vibration damper (harmonic balancer).	P-2
01.36	Disassemble engine block; clean and prepare components for inspection and reassembly.	P-1
01.37	Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.	P-2
01.38	Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.	P-2
01.39	Deglaze and clean cylinder walls.	P-2
01.40	Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.	P-3
01.41	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
01.42	Inspect main and connecting rod bearings for damage and wear; determine necessary action.	P-2
01.43	Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.	P-3
01.44	Inspect and measure piston skirts and ring lands; determine necessary action.	P-2
01.45	Determine piston-to-bore clearance.	P-2
01.46	Inspect, measure, and install piston rings.	P-2
01.47	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
01.48	Assemble engine block.	P-1
01.49	Remove and replace piston pin.	
01.50	Perform oil pressure tests; determine necessary action.	P-1
01.51	Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.	P-2
01.52	Perform cooling system pressure and dye test to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core and gallery plugs; determine necessary action.	P-1
01.53	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.	P-1
01.54	Remove, inspect, and replace thermostat and gasket/seal.	P-1
01.55	Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.	P-1

CTE Standards and Benchmarks	Priority Number
01.56 Inspect, remove and replace water pump.	P-2
01.57 Remove and replace radiator.	P-2
01.58 Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.	P-1
01.59 Inspect auxiliary coolers; determine necessary action.	P-3
01.60 Inspect, test, and replace oil temperature and pressure switches and sensors.	P-2
01.61 Perform engine oil and filter change.	P-1
01.62 Identify causes of engine overheating.	P-1
01.63 Inspect and replace engine cooling and heater system hoses.	
01.64 Service product specific water pumps.	
01.65 Service product specific belt drive and tensioner systems.	

Florida Department of Education
Student Performance Standards

Course Number: AER0258
Occupational Completion Point: B
Advanced Automatic Transmission and Transaxle Technician – 200 Hours – SOC Code 49-3023

Course Description:
The Advanced Automatic Transmission and Transaxle Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study automatic transmission/transaxle diagnosis, service, and repair.

Abbreviations:
AT = Automatic Transmission/Transaxle

For every task in Advanced Automatic Transmission and Transaxle Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

AT Task List:	
P-1	**15**
P-2	**20**
P-3	**4**
Total	**39**

CTE Standards and Benchmarks		**Priority Number**
02.0	Explain and apply proficiently the diagnosis, service, repair and overhaul of automatic transmissions/transaxles --The student will be able to:	
02.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
02.02	Identify and interpret transmission/transaxle concern, differentiate between engine performance and transmission/transaxle concerns; determine necessary action.	P-1
02.03	Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
02.04	Locate and interpret vehicle and major component identification numbers.	
02.05	Diagnose fluid loss and condition concerns; determine necessary action.	P-1
02.06	Check fluid level in a transmission or a transaxle equipped with a dipstick.	P-1
02.07	Check fluid level in a transmission or a transaxle not equipped with a dipstick.	P-1
02.08	Perform pressure tests (including transmissions/transaxles equipped with electronic pressure control); determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
02.09	Perform stall test; determine necessary action.	P-3
02.10	Perform lock-up converter system tests; determine necessary action.	P-3
02.11	Diagnose noise and vibration concerns; determine necessary action.	P-2
02.12	Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.	P-1
02.13	Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).	P-2
02.14	Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.	P-1
02.15	Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.	P-2
02.16	Inspect for leakage; replace external seals, gaskets, and bushings.	P-2
02.17	Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses.	P-1
02.18	Inspect, replace, and align powertrain mounts.	P-2
02.19	Drain and replace fluids and filter(s).	P-1
02.20	Diagnose electronic transmission control systems using a scan tool; determine necessary action.	
02.21	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
02.22	Disassemble, clean, and inspect transmission/transaxle.	P-2
02.23	Inspect, measure, clean, and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check valves/balls, screens, spacers, and gaskets).	P-2
02.24	Inspect servo and accumulator bores, pistons, seals, pins, springs, and retainers; determine necessary action.	P-2
02.25	Assemble transmission/transaxle.	P-2
02.26	Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.	P-1
02.27	Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.	P-2
02.28	Inspect, measure, and reseal oil pump assembly and components.	P-2
02.29	Measure transmission/transaxle end play or preload; determine necessary action.	P-1
02.30	Inspect, measure, and replace thrust washers and bearings.	P-2
02.31	Inspect oil delivery circuits, including seal rings, ring grooves, and sealing surface areas, feed pipes, orifices, and check valves/balls.	P-2
02.32	Inspect bushings; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
02.33	Inspect and measure planetary gear assembly components; determine necessary action.	P-2
02.34	Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action.	P-2
02.35	Diagnose and inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; perform necessary action.	P-2
02.36	Inspect, measure, repair, adjust or replace transaxle final drive components.	P-2
02.37	Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; determine necessary action.	P-2
02.38	Measure clutch pack clearance; determine necessary action.	P-1
02.39	Air test operation of clutch and servo assemblies.	P-1
02.40	Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; determine necessary action.	P-2
02.41	Describe the operational characteristics of a continuously variable transmission (CVT).	P-3
02.42	Describe the operational characteristics of a hybrid vehicle drive train.	P-3
02.43	Install and seat torque converter to engage drive/splines.	
02.44	Inspect bands and drums; determine necessary action.	

Florida Department of Education
Student Performance Standards

Course Number: AER0275
Occupational Completion Point: C
Advanced Manual Drivetrain and Axle Technician – 200 Hours – SOC Code 49-3023

Course Description:
The Advanced Manual Drivetrain and Axle Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study manual drivetrain, clutch, transmission/transaxle, drive and half-shaft universals, constant velocity joints, rear axle differential, limited slip, four-wheel drive, all-wheel drive operation, assembly, diagnosis, service and repair.

Abbreviations:
MD = Manual Drivetrain and Axles

For every task in Advanced Manual Drivetrain and Axle Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

MD Task List:	
	P-1 = 17
	P-2 = 12
	P-3 = 20
Total	**49**

CTE Standards and Benchmarks		Priority Number
03.0	Explain and apply proficiently the operation, assembly, diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, rear axle differential assembly, limited slip, four-wheel drive and all-wheel drive--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.	
03.02	Identify and interpret drive train concern; determine necessary action.	P-1
03.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
03.04	Check fluid condition; check for leaks; determine necessary action.	P-1
03.05	Locate and interpret vehicle and major component identification numbers.	
03.06	Diagnose fluid loss, level, and condition concerns; determine necessary action.	
03.07	Drain and refill manual transmission/transaxle and final drive unit.	P-1
03.08	Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
03.09	Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.	P-1
03.10	Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.	
03.11	Check and adjust clutch master cylinder fluid level; check for leaks.	P-1
03.12	Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).	P-1
03.13	Bleed clutch hydraulic system.	P-1
03.14	Inspect flywheel and ring gear for wear and cracks; determine necessary action.	P-1
03.15	Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.	
03.16	Measure flywheel run out and crankshaft end play; determine necessary action.	P-2
03.17	Remove and reinstall transmission/transaxle.	
03.18	Disassemble, inspect, clean, and reassemble internal transmission/transaxle components.	P-3
03.19	Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.	
03.20	Diagnose noise concerns through the application of transmission/transaxle powerflow principles.	P-2
03.21	Diagnose hard shifting and jumping out of gear concerns; determine necessary action.	P-2
03.22	Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.	P-2
03.23	Inspect, replace, and align powertrain mounts.	
03.24	Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.	
03.25	Remove and replace transaxle final drive.	
03.26	Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.	
03.27	Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.	
03.28	Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.	
03.29	Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action.	P-3
03.30	Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.	
03.31	Inspect lubrication devices (oil pump or slingers); perform necessary action.	
03.32	Inspect, test, and replace transmission/transaxle sensors and switches.	
03.33	Describe the operational characteristics of an electronically controlled manual transmission/transaxle.	P-3

CTE Standards and Benchmarks		Priority Number
03.34	Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.	P-1
03.35	Diagnose universal joint noise and vibration concerns; perform necessary action.	P-2
03.36	Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.	P-1
03.37	Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.	P-1
03.38	Inspect, service, and replace shaft center support bearings.	
03.39	Check shaft balance and phasing; measure shaft run out; measure and adjust driveline angles.	P-2
03.40	Diagnose noise and vibration concerns; determine necessary action.	
03.41	Inspect and replace companion flange and pinion seal; measure companion flange run out.	P-2
03.42	Inspect ring gear and measure run out; determine necessary action.	P-3
03.43	Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings.	P-3
03.44	Measure and adjust drive pinion depth.	P-3
03.45	Measure and adjust drive pinion bearing preload.	P-3
03.46	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-3
03.47	Check ring and pinion tooth contact patterns; perform necessary action.	P-3
03.48	Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case.	P-3
03.49	Reassemble and reinstall differential case assembly; measure run out; determine necessary action.	P-3
03.50	Diagnose noise, slippage, and chatter concerns; determine necessary action.	P-3
03.51	Clean and inspect differential housing; check for leaks; inspect housing vent.	P-2
03.52	Check and adjust differential housing fluid level.	P-1
03.53	Drain and refill differential housing.	P-1
03.54	Inspect and reinstall limited slip differential components.	
03.55	Measure rotating torque; determine necessary action.	P-3
03.56	Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action.	P-2
03.57	Inspect and replace drive axle wheel studs.	P-1
03.58	Remove and replace drive axle shafts.	P-1
03.59	Inspect and replace drive axle shaft seals, bearings, and retainers.	P-2

CTE Standards and Benchmarks		Priority Number
03.60	Measure drive axle flange run out and shaft end play; determine necessary action.	P-2
03.61	Diagnose noise and vibration concerns; determine necessary action.	P-2
03.62	Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.	P-3
03.63	Remove and reinstall transfer case.	
03.64	Disassemble, service, and reassemble transfer case and components.	P-3
03.65	Inspect front-wheel bearings and locking hubs; perform necessary action(s).	P-3
03.66	Check for leaks at drive assembly seals; check vents; check lube level.	P-3
03.67	Diagnose, test, adjust, and replace electrical/electronic components of four-wheel drive systems.	P-3
03.68	Diagnose noise, vibration, and unusual steering concerns; determine necessary action.	P-3
03.69	Identify concerns related to variations in tire circumference and/or final drive ratios.	P-3

Florida Department of Education
Student Performance Standards

Course Number: AER0459
Occupational Completion Point: D
Advanced Automotive Suspension and Steering Technician – 200 Hours – SOC Code 49-3023

Course Description:
The Advanced Automotive Suspension and Steering Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study front and rear suspension systems, wheel alignment, wheels and tire, diagnosis, service, and repair.

Abbreviations:
SS = Suspension and Steering

For every task in Advanced Automotive Suspension and Steering Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

SS Task List:	
P-1 =	**23**
P-2 =	**22**
P-3 =	**12**
Total	**57**

CTE Standards and Benchmarks		**Priority Number**
04.0	Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires --The student will be able to:	
04.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
04.02	Identify and interpret suspension and steering system concerns; determine necessary action.	P-1
04.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
04.04	Locate and interpret vehicle and major component identification numbers.	
04.05	Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1
04.06	Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1
04.07	Inspect, remove, and install upper and lower control arms, bushings, shafts, and rebound and jounce bumpers.	P-3
04.08	Inspect, remove and install strut rods and bushings.	P-3

CTE Standards and Benchmarks		Priority Number
04.09	Inspect, remove and install upper and/or lower ball joints (with or without wear indicators).	P-2
04.10	Inspect, remove and install steering knuckle assemblies.	P-3
04.11	Inspect, remove and install short and long arm suspension system coil springs and spring insulators.	P-3
04.12	Inspect, remove and install torsion bars and mounts.	P-3
04.13	Inspect, remove and install front stabilizer bar (sway bar) bushings, brackets, and links.	P-3
04.14	Inspect, remove and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.	P-3
04.15	Inspect, remove and install track bar, strut rods/radius arms and related mounts and bushings.	P-3
04.16	Inspect rear suspension system leaf spring(s), bushings, center pins/bolts and mounts.	P-1
04.17	Inspect, remove, and replace shock absorbers; inspect mounts and bushings.	P-1
04.18	Remove, inspect, and service or replace front and rear wheel bearings.	P-1
04.19	Describe the function of the power steering pressure switch.	P-3
04.20	Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concern; determine necessary action.	P-1
04.21	Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.	P-1
04.22	Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.	P-1
04.23	Check toe-out-on-turns (turning radius); determine necessary action.	P-2
04.24	Check SAI (steering axis inclination) and included angle; determine necessary action.	P-2
04.25	Check rear wheel thrust angle; determine necessary action.	P-1
04.26	Check for front wheel setback; determine necessary action.	P-2
04.27	Check front and/or rear cradle (sub-frame) alignment; determine necessary action.	P-3
04.28	Reset steering angle sensor.	P-2
04.29	Disable and enable supplemental restraint system (SRS).	P-1
04.30	Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).	P-1
04.31	Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.	P-2
04.32	Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.	P-2
04.33	Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; perform necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
04.34	Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.	P-2
04.35	Adjust non-rack and pinion worm bearing preload and sector lash.	
04.36	Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.	P-2
04.37	Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.	P-2
04.38	Determine proper power steering fluid type; inspect fluid level and condition.	P-1
04.39	Flush, fill, and bleed power steering system.	P-2
04.40	Inspect for power steering fluid leakage; determine necessary action.	P-1
04.41	Remove, inspect, replace, and adjust power steering pump drive belt.	P-1
04.42	Remove and reinstall power steering pump.	P-2
04.43	Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.	P-2
04.44	Inspect and replace power steering hoses and fittings.	P-2
04.45	Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.	P-2
04.46	Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.	P-1
04.47	Test and diagnose components of electronically-controlled steering systems using a scan tool; determine necessary action.	P-3
04.48	Inspect electric power-assisted steering.	P-3
04.49	Identify hybrid vehicle power steering system electrical circuits and safety precautions.	P-2
04.50	Inspect tire condition; identify tire wear patterns; check of correct tire size and application (load and speed rating) and adjust air pressure; determine necessary action.	P-1
04.51	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	P-2
04.52	Rotate tires according to manufacturer’s recommendations.	P-1
04.53	Measure wheel, tire, axle flange, and hub run out; determine necessary action.	P-2
04.54	Diagnose tire pull problems; determine necessary action.	P-2
04.55	Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).	P-1
04.56	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	P-2
04.57	Reinstall wheel; torque lug nuts.	
04.58	Inspect tire and wheel assembly for air loss; perform necessary action.	P-1
04.59	Repair tire using internal patch.	P-1

CTE Standards and Benchmarks		Priority Number
04.60	Identify and test pressure monitor system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lambs.	P-2
04.61	Demonstrate knowledge of steps required to remove and replace sensor in a tire pressure monitoring system.	P-1
04.62	Service product specific suspension systems.	
04.63	Service product specific ride height control systems.	

Florida Department of Education
Student Performance Standards

Course Number: AER0419
Occupational Completion Point: E
Advanced Automotive Brake System Technician – 200 Hours – SOC Code 49-3023

Course Description:
The Advanced Automotive Brake System Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study drum/disc brakes, hydraulics, power assist units, electronic brakes, traction control, stability control, and miscellaneous diagnostics, service, and repair.

Abbreviations:
BR = Brakes

For every task in Advanced Automotive Brake System Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

BR Task List:	
	P-1 = 34
	P-2 = 12
	P-3 = 11
Total	**57**

CTE Standards and Benchmarks		Priority Number
05.0	Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems--The student will be able to:	
05.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
05.02	Identify and interpret brake system concern; determine necessary action.	P-1
05.03	Describe procedures for performing a road test to check brake system operation; including an antilock brake system (ABS).	P-1
05.04	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
05.05	Install wheel and torque lug nuts.	P-1
05.06	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).	
05.07	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1
05.08	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
05.09	Check master cylinder for internal/external leaks and proper operation; determine necessary action.	P-1
05.10	Remove, bench bleed, and reinstall master cylinder.	P-1
05.11	Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P-3
05.12	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; check for loose fittings and supports; determine necessary action.	P-1
05.13	Replace brake lines, hoses, fittings, and supports.	P-2
05.14	Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	P-2
05.15	Select, handle, store, and fill brake fluids to proper level.	P-1
05.16	Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.	
05.17	Inspect, test, and/or replace components of brake warning light system.	P-3
05.18	Identify components of brake warning light system.	P-2
05.19	Bleed and/or flush brake system.	P-1
05.20	Test brake fluid for contamination.	P-1
05.21	Diagnose poor drum brake stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P-1
05.22	Remove, clean, inspect, and measure brake drums; determine necessary action.	P-1
05.23	Refinish brake drum and measure final drum diameter; compare with specifications.	P-1
05.24	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
05.25	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-2
05.26	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.	P-2
05.27	Install wheel, torque lug nuts, and make final checks and adjustments associated with drum brakes.	
05.28	Diagnose poor disk brake stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	P-1
05.29	Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.	P-1
05.30	Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.	P-1
05.31	Remove, inspect, and replace pads and retaining hardware; determine necessary action.	P-1
05.32	Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.	

CTE Standards and Benchmarks		Priority Number
05.33	Lubricate and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	P-1
05.34	Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral run out; determine necessary action.	P-1
05.35	Remove and reinstall rotor.	P-1
05.36	Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.	P-1
05.37	Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.	P-1
05.38	Retract and re-adjust caliper piston on an integrated parking brake system.	P-3
05.39	Install wheel, torque lug nuts, and make final checks and adjustments associated with disc brakes.	
05.40	Check brake pad wear indicator; determine necessary action.	P-2
05.41	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.	P-1
05.42	Check brake pedal travel with, and without engine running to verify proper power booster operation.	P-2
05.43	Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P-1
05.44	Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.	P-1
05.45	Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.	P-3
05.46	Measure and adjust master cylinder pushrod length.	P-3
05.47	Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.	P-3
05.48	Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.	P-1
05.49	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	P-2
05.50	Check parking brake operation and parking brake indicator light system; determine necessary action.	P-1
05.51	Check operation of brake stop light system.	P-1
05.52	Replace wheel bearing and race.	P-2
05.53	Inspect and replace wheel studs.	P-1
05.54	Remove and reinstall sealed wheel bearing assembly.	P-2
05.55	Identify and inspect electronic brake control system components; determine necessary action.	P-1
05.56	Identify traction control/vehicle stability control system components.	P-3
05.57	Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.	P-2
05.58	Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
05.59	Depressurize high-pressure components of the electronic brake control system.	P-3
05.60	Bleed the electronic brake control system hydraulic circuits.	P-1
05.61	Remove and install electronic brake control system electrical/electronic and hydraulic components.	
05.62	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).	P-3
05.63	Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).	P-3
05.64	Describe the operation of a regenerative braking system.	P-3
05.65	Service product specific anti-lock brake systems	
05.66	Service product specific traction control systems.	

Florida Department of Education
Student Performance Standards

Course Number: AER0173
Occupational Completion Point: F
Advanced Automotive Heating and Air Conditioning Technician – 200 Hours – SOC Code 49-3023

Course Description:
The Advanced Automotive Heating and Air Conditioning Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, recycling and handling, diagnostics, service, and repair.

Abbreviations:
HA = Heating and Air Conditioning

For every task in Advanced Automotive Heating and Air Conditioning Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

HA Task List:	
P-1 =	**17**
P-2 =	**17**
P-3 =	**4**
Total	**38**

CTE Standards and Benchmarks		**Priority Number**
06.0	Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, compressors, compressor clutches, evaporators, receiver driers, accumulators, condensers, heating and engine cooling, related control systems, refrigerant recovery, and recycling and handling--The student will be able to:	
06.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
06.02	Identify and interpret heating and air conditioning problems; determine necessary action.	P-1
06.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
06.04	Locate and interpret vehicle and major component identification numbers.	
06.05	Performance test A/C system; identify problems.	P-1
06.06	Identify abnormal operating noises in the A/C system; determine necessary action.	P-2
06.07	Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings.	P-1
06.08	Leak test A/C system; determine necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
06.09	Inspect the condition of refrigerant oil removed from A/C system; determine necessary action.	P-2
06.10	Determine recommended oil and oil capacity for system application.	P-1
06.11	Using a scan tool, observe and record related HVAC data and trouble codes.	P-3
06.12	Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.	P-2
06.13	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.	P-1
06.14	Inspect, test, service or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.	P-2
06.15	Remove, inspect, and reinstall A/C compressor and mountings; determine recommended oil quantity.	P-2
06.16	Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.	P-2
06.17	Determine the need for an additional A/C system filter; perform necessary action.	P-3
06.18	Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.	P-2
06.19	Inspect A/C condenser for airflow restrictions; perform necessary action.	P-1
06.20	Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity.	P-2
06.21	Remove, inspect, and install expansion valve or orifice (expansion) tube.	P-1
06.22	Inspect evaporator housing water drain; perform necessary action.	P-1
06.23	Determine procedure to remove and reinstall evaporator; determine required oil quantity.	P-2
06.24	Remove, inspect, and reinstall condenser; determine required oil quantity.	P-2
06.25	Diagnose temperature control problems in the heater/ventilation system; (determine PCM) to interpret system operation; determine necessary action.	P-2
06.26	Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action.	
06.27	Inspect engine cooling and heater system hoses; perform necessary action.	P-1
06.28	Determine procedure to remove, inspect, and reinstall heater core.	P-2
06.29	Inspect, test, and replace thermostat and gasket/seal.	
06.30	Determine coolant condition and coolant type for vehicle application; drain and recover coolant.	
06.31	Flush system; refill system with recommended coolant; bleed system.	
06.32	Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.	
06.33	Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.	

CTE Standards and Benchmarks		Priority Number
06.34	Inspect and test heater control valve(s); perform necessary action.	P-2
06.35	Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.	P-1
06.36	Diagnose A/C compressor clutch control systems; determine necessary action.	P-2
06.37	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
06.38	Inspect and test A/C-heater control panel assembly; determine necessary action.	P-3
06.39	Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.	P-3
06.40	Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.	P-1
06.41	Identify the source of A/C system odors.	P-2
06.42	Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.	P-2
06.43	Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.	P-1
06.44	Identify and recover A/C system refrigerant.	P-1
06.45	Recycle, label, and store refrigerant.	P-1
06.46	Evacuate and charge A/C system; add refrigerant oil as required.	P-1
06.47	Service product specific climate control systems.	

Florida Department of Education
Student Performance Standards

Course Number: AER0506
Occupational Completion Point: G
Advanced Automotive Engine Performance Technician – 400 Hours – SOC Code 49-3023

Course Description:
The Advanced Automotive Engine Performance Technician course prepares students for entry into the Automotive Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study engines, ignition, fuel, air induction, exhaust, computer, engine and emission control systems diagnostics, service, and repair.

Abbreviations:
EP = Engine Performance

For every task in Advanced Automotive Engine Performance Technician course, 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 chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

EP Task List:	
P-1	**21**
P-2	**17**
P-3	**9**
Total	**47**

CTE Standards and Benchmarks		**Priority Number**
07.0	Explain and apply proficiently the diagnosis, service and repair of engines, ignition, fuel, air induction, exhaust, computer engine and emission control systems --The student will be able to:	
07.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
07.02	Identify and interpret engine performance concern; determine necessary action.	P-1
07.03	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1
07.04	Locate and interpret vehicle and major component identification numbers.	
07.05	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	
07.06	Diagnose abnormal engine noise or vibration concerns; determine necessary action.	P-3
07.07	Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine necessary action.	P-2
07.08	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.	P-1
07.09	Perform cylinder power balance test; determine necessary action.	P-2

CTE Standards and Benchmarks		Priority Number
07.10	Perform cylinder cranking and running compression tests; determine necessary action.	P-1
07.11	Perform cylinder leakage test; determine necessary action.	P-1
07.12	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.	P-2
07.13	Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.	
07.14	Verify engine operating temperature; determine necessary action.	P-1
07.15	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.	
07.16	Verify correct camshaft timing.	P-1
07.17	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	P-1
07.18	Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.	P-1
07.19	Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action.	P-1
07.20	Check for module communication (including CAN/BUS systems) errors using a scan tool.	
07.21	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-2
07.22	Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1
07.23	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
07.24	Perform active tests of actuators using a scan tool; determine necessary action.	P-2
07.25	Describe the importance of running all OBDII monitors for repair verification.	P-1
07.26	Diagnose (troubleshoot) 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-2
07.27	Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.	
07.28	Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.	P-1
07.29	Remove and replace spark plugs; inspect secondary ignition components for wear and damage.	P-1
07.30	Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.	P-3
07.31	Diagnose (troubleshoot) 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-2

CTE Standards and Benchmarks		Priority Number
07.32	Check fuel for contaminants; determine necessary action.	P-2
07.33	Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.	P-1
07.34	Replace fuel filters.	P-1
07.35	Inspect, service or replace air filters, filter housing and intake duct work.	P-1
07.36	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.	P-2
07.37	Inspect and test fuel injectors.	P-2
07.38	Verify idle control operation.	P-1
07.39	Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform necessary action.	P-1
07.40	Inspect condition of exhaust system hangers, brackets, clamps and heat shields; repair or replace as needed.	P-1
07.41	Perform exhaust system back-pressure test; determine necessary action.	P-2
07.42	Check and refill diesel exhaust fluid (DEF).	P-3
07.43	Test the operation of turbocharger/supercharger systems; determine necessary action.	P-3
07.44	Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.	P-3
07.45	Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.	P-2
07.46	Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.	P-3
07.47	Diagnose emissions and driveability concerns caused by the secondary injection and catalytic converter systems; determine necessary action.	P-2
07.48	Inspect, test, service and replace components of the EGR system, including tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.	P-2
07.49	Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.	P-2
07.50	Inspect and test mechanical components of secondary air injection systems; perform necessary action.	
07.51	Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.	P-3
07.52	Inspect and test catalytic converter efficiency.	P-2
07.53	Diagnose emissions and driveability concerns caused by the evaporative emissions control system; determine necessary action.	P-2
07.54	Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.	P-1

CTE Standards and Benchmarks		Priority Number
07.55	Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.	P-3
07.56	Adjust valves on engines with mechanical or hydraulic lifters.	
07.57	Remove and replace timing belt; verify correct camshaft timing.	
07.58	Remove and replace thermostat and gasket/seal.	
07.59	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.	
07.60	Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.	
07.61	Perform engine oil and filter change.	
07.62	Identify hybrid vehicle internal combustion engine service precautions.	
07.63	Demonstrate proficiency in use of computer-based information systems.	
07.64	Perform product specific OBD II drive cycle diagnostic tests.	
07.65	Service product specific ignition systems.	
07.66	Inspect and test distributor; service as needed.	
07.67	Perform exhaust system back-pressure test; determine needed action.	
07.68	Service product specific fuel injection systems.	

Additional Information

Laboratory Activities

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

Special Notes

Benchmarks identified with a designation of P-1, P-2, or P-3 are NATEF tasks. NATEF requires that a minimum of 95% of P-1 tasks, 80% of P-2 tasks, and 50% of P-3 tasks are to be accomplished.

The standard length of this program is 2400 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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Avionics 1**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T640100
CIP Number	0647060900
Grade Level	30, 31
Standard Length	1400 hours
Teacher Certification	AVIONICS @7 7G ELECTRONIC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2091 – Avionics Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

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.

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

Program Structure

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

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	EEV0010	Electronics Assembler	250 hours	49-2091
B	EEV0100	Electronics Tester	400 hours	49-2091
C	EEV0616	Electronics Technician	375 hours	49-2091
D	EEV0500	Electronics Equipment Repairer	375 hours	49-2091

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Avionics program can be found using the following links:

www.faa.gov/
http://www.eta-i.org/

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate proficiency in soldering and basic laboratory practices.
02.0 Demonstrate proficiency in basic DC circuits.
03.0 Demonstrate proficiency in advanced DC circuits.
04.0 Demonstrate proficiency in AC circuits.
05.0 Demonstrate proficiency in solid state devices.
06.0 Demonstrate skills in technical recording utilizing industry recognized computer application software.
07.0 Demonstrate proficiency in analog circuits.
08.0 Demonstrate proficiency in digital circuits.
09.0 Demonstrate proficiency in fundamental micro-processors.

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

Course Description:
The Electronics Assembler course prepares students for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study basic laboratory practices, and direct current (DC) circuitry.

CTE Standards and Benchmarks	
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	Apply recognized industry accepted standard soldering techniques.
01.06	Apply recognized industry accepted standard desoldering techniques.
01.07	Apply recognized industry accepted standard electrostatic discharge (ESD) safety procedures.
01.08	Design and/or construct printed circuit boards (PCB's) to industry accepted standards.
01.09	Explain the theoretical concepts of industry accepted soldering techniques.
01.10	Apply recognized industry accepted standard techniques for rework and repair.
02.0	Demonstrate proficiency in basic DC circuits--The student will be able to:
02.01	Demonstrate proficiency in basic DC 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.

CTE Standards and Benchmarks	
02.06	Read and interpret color codes and symbols to identify electrical components and values.
02.07	Measure properties of a circuit using a digital multi-meter (DMM).
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.

Florida Department of Education
Student Performance Standards

Course Number: EEV0100
Occupational Completion Point: B
Electronics Tester – 400 Hours – SOC Code 49-2091

Course Description:
The Electronics Tester course is designed to build on the skills and knowledge students learned in the Electronics Assembler course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study advanced direct current (DC) circuitry, alternating current (AC) circuitry, and solid state circuitry.

CTE Standards and Benchmarks	
03.0	Demonstrate proficiency in advanced DC circuits--The student will be able to:
03.01	Solve algebraic problems to include exponentials to DC.
03.02	Describe the relationship of DC electricity to the nature of matter.
03.03	Apply Ohm's law to series-parallel and parallel-series circuits.
03.04	Construct and verify the operation of series-parallel and parallel-series and bridge circuits.
03.05	Troubleshoot series-parallel and parallel-series and bridge circuits.
03.06	Identify and define voltage divider circuits (loaded and unloaded).
03.07	Construct and verify the operation of voltage divider circuits (loaded and unloaded).
03.08	Analyze and troubleshoot voltage divider circuits (loaded and unloaded).
03.09	Apply maximum power transfer theorem.
03.10	Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.
03.11	Describe magnetic properties of circuits and devices.
03.12	Determine the physical and electrical characteristics of capacitors and inductors.
03.13	Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.
03.14	Set up and operate power supplies for DC circuits.
03.15	Explain the theory of DC motor operation.
03.16	Identify the practical applications for the use of a DC motor.
04.0	Demonstrate proficiency in AC circuits--The student will be able to:

CTE Standards and Benchmarks	
04.01	Solve basic trigonometric problem as applicable to electronics.
04.02	Define the characteristics of AC capacitive circuits.
04.03	Construct and verify the operation of AC capacitive circuits.
04.04	Analyze and troubleshoot AC capacitive circuits.
04.05	Define the characteristics of AC inductive circuits.
04.06	Construct and verify the operation of AC inductive circuits.
04.07	Analyze and troubleshoot AC inductive circuits.
04.08	Define and apply the principles of transformers to AC circuits.
04.09	Construct and verify the operation of AC circuits utilizing transformers.
04.10	Analyze and troubleshoot AC circuits utilizing transformers.
04.11	Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.
04.12	Analyze and troubleshoot differentiator and integrator circuits.
04.13	Define the characteristics of Resistive, Inductive, and Capacitive (RLC) circuits (series, parallel and complex).
04.14	Construct and verify the operation of series and parallel resonant circuits.
04.15	Define the characteristics of series and parallel resonant circuits.
04.16	Construct and verify the operation of series and parallel resonant circuits.
04.17	Analyze and troubleshoot R-C, R-L, and RLC circuits.
04.18	Define the characteristics of frequency selective filter circuits.
04.19	Construct and verify the operation of frequency selective filter circuits.
04.20	Analyze and troubleshoot frequency selective filter circuits.
04.21	Define the characteristics of polyphase circuits.
04.22	Define basic motor theory and operation.
04.23	Define basic generator theory and operation.
04.24	Set up and operate power supplies for AC circuits.
04.25	Set up and operate oscilloscopes for AC circuits.
04.26	Set up and operate function generators for AC circuits.
04.27	Analyze and measure power in AC circuits.

CTE Standards and Benchmarks	
	04.28 Set up and operate capacitor and inductor analyzers for AC circuits.
	04.29 Explain the theory of AC motor operation.
	04.30 Identify the practical applications for the use of an AC motor.
05.0	Demonstrate proficiency in solid state devices--The student will be able to:
	05.01 Identify and define properties of semiconductor materials.
	05.02 Identify and define operating characteristics and applications of junction diodes.
	05.03 Identify and define operating characteristics and applications of special diodes, ex. Zener diodes.
	05.04 Construct diode circuits.
	05.05 Analyze and troubleshoot diode circuits.
	05.06 Identify and define operating characteristics and applications of bipolar transistors,
	05.07 Identify and define operating characteristics and applications of field effect transistors.
	05.08 Identify and define operating characteristics and applications of single-stage amplifiers.
	05.09 Construct single-stage amplifiers.
	05.10 Analyze and troubleshoot single-stage amplifiers.
	05.11 Construct thyristor circuitry.
	05.12 Analyze and troubleshoot thyristor circuitry.
	05.13 Set up and operate power supplies for solid-state devices.
	05.14 Set up and operate oscilloscopes for solid-state devices.
	05.15 Set up and operate function generators for solid-state devices.
	05.16 Set up and operate capacitor and inductor analyzers for solid-state devices.
	05.17 Set up and operate curve tracers.
	05.18 Set up and operate transistor testers.

Florida Department of Education
Student Performance Standards

Course Number: EEV0616
Occupational Completion Point: C
Electronics Technician – 375 Hours – SOC Code 49-2091

Course Description:
The Electronics Technician course is designed to build on the skills and knowledge students learned in the Electronics Tester course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study analog circuitry, and technical writing.

CTE Standards and Benchmarks	
06.0	Demonstrate skills in technical recording utilizing industry recognized computer application software--The student will be able to:
06.01	Draw and interpret electronic schematics.
06.02	Record data and design curves and graphs.
06.03	Write reports and make oral presentations.
06.04	Maintain test logs.
06.05	Make equipment failure reports.
06.06	Specify and requisition simple electronic components.
06.07	Compose technical letters and memoranda.
06.08	Write formal reports of laboratory experiences.
06.09	Draft preventive maintenance and calibration procedures.
07.0	Demonstrate proficiency in analog circuits--The student will be able to:
07.01	Identify and define operational characteristics and applications of multistage amplifiers.
07.02	Construct multistage amplifiers.
07.03	Analyze and troubleshoot multistage amplifiers.
07.04	Identify and define operating characteristics and applications of linear integrated circuits.
07.05	Identify and define operating characteristics and applications of basic power supplies and filters.
07.06	Construct basic power supplies and filters.
07.07	Identify and define operating characteristics and applications of differential and operational amplifiers.

CTE Standards and Benchmarks	
07.08	Construct differential and operational amplifier circuits.
07.09	Analyze and troubleshoot differential and operational amplifier circuits.
07.10	Identify and define operating characteristics of audio power amplifiers.
07.11	Construct audio power amplifiers.
07.12	Analyze and troubleshoot audio power amplifiers.
07.13	Identify and define operating characteristics and applications of power supply regulator circuits.
07.14	Construct power supply regulator circuits.
07.15	Analyze and troubleshoot power supply regulator circuits.
07.16	Identify and define operating characteristics and applications of active filters.
07.17	Construct active filter circuits.
07.18	Analyze and troubleshoot active filter circuits.
07.19	Identify and define operating characteristics and applications of sinusoidal and nonsinusoidal oscillator circuits.
07.20	Construct oscillator circuits.
07.21	Analyze and troubleshoot oscillator circuits.
07.22	Identify and define operating characteristics and applications of Liquid Crystal Display (LCD), Light Emitting Diode (LED), and Three Dimensional (3D) technologies.
07.23	Identify and define operating characteristics and applications of optoelectronic devices.
07.24	Set up and operate measuring instruments for analog circuits.

Florida Department of Education
Student Performance Standards

Course Number: EEV0500
Occupational Completion Point: D
Electronics Equipment Repairer – 375 Hours – SOC Code 49-2091

Course Description:
The Electronics Equipment Repairer course is designed to build on the skills and knowledge students learned in the Electronics Technician course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study digital circuitry, and micro-processors.

CTE Standards and Benchmarks	
08.0	Demonstrate proficiency in digital circuits--The student will be able to:
08.01	Define and apply numbering systems to codes and arithmetic operations.
08.02	Analyze and minimize logic circuits using Boolean operations.
08.03	Set up and operate logic probes for digital circuits.
08.04	Set up and operate power supplies for digital circuits and solve power distribution and noise problems.
08.05	Set up and operate pulsers for digital circuits.
08.06	Set up and operate oscilloscopes for digital circuits.
08.07	Set up and operate logic analyzers for digital circuits.
08.08	Set up and operate pulse generators for digital circuits.
08.09	Identify types of logic gates and their truth tables.
08.10	Construct combinational logic circuits using integrated circuits.
08.11	Troubleshoot logic circuits.
08.12	Analyze types of flip-flops and their truth tables.
08.13	Construct flip-flops using integrated circuits.
08.14	Troubleshoot flip-flops.
08.15	Identify, define and measure characteristics of integrated circuit (IC) logic families.
08.16	Identify types of registers and counters.
08.17	Construct registers and counters using flip-flops and logic gates.

CTE Standards and Benchmarks	
08.18	Troubleshoot registers and counters.
08.19	Analyze clock and timing circuits.
08.20	Construct clock and timing circuits.
08.21	Troubleshoot clock and timing circuits.
08.22	Identify types of arithmetic-logic circuits.
08.23	Construct arithmetic-logic circuits.
08.24	Troubleshoot arithmetic-logic circuits.
08.25	Identify types of encoding and decoding devices.
08.26	Construct encoders and decoders.
08.27	Troubleshoot encoders and decoders.
08.28	Identify types of multiplexer and demultiplexer circuits.
08.29	Construct multiplexer and demultiplexer circuits using integrated circuits.
08.30	Troubleshoot multiplexer and demultiplexer circuits.
08.31	Identify types of memory circuits.
08.32	Relate the uses of digital-to-analog and analog-to-digital conversions.
08.33	Construct digital-to-analog and analog-to-digital circuits.
08.34	Troubleshoot digital-to-analog and analog-to-digital circuits.
08.35	Identify types of digital displays.
08.36	Construct digital display circuits.
08.37	Troubleshoot digital display circuits.
09.0	Demonstrate proficiency in fundamental micro-processors--The student will be able to:
09.01	Identify central processing unit (CPU) building blocks and their uses (architecture).
09.02	Safely install and remove a CPU without damaging.
09.03	Analyze bus concepts.
09.04	Analyze various memory schemes.
09.05	Use memory devices in circuits.
09.06	Troubleshoot memory device circuits.

CTE Standards and Benchmarks	
09.07	Set up and operate oscilloscopes for microprocessor systems.
09.08	Set up and operate logic-data analyzers to troubleshoot microprocessor systems.
09.09	Identify types of input and output devices and peripherals.
09.10	Interface input and output ports to peripherals.
09.11	Analyze and troubleshoot input and output ports.
09.12	Compare and contrast macro processor programming language types.
09.13	Diagram the macro processor programming sequence using a flow chart.

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Avionics 2**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T640200
CIP Number	0647060901
Grade Level	30, 31
Standard Length	720 hours
Teacher Certification	AVIONICS @7 7G ELECTRONIC @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2091 – Avionics Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 10 Language: 10 Reading: 10

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.

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

Program Structure

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

The 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.**

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	AVS0090	Avionics Technical Publications Technician	180 hours	49-2091
B	AVS0091	Avionics Installer	180 hours	49-2091
C	AVS0092	Avionics Communications System Technician	180 hours	49-2091
D	AVS0093	Avionics Technician	180 hours	49-2091

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Avionics program can be found using the following links:

www.faa.gov/
http://www.eta-i.org/

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Demonstrate proficiency in avionics radio repair station regulations and procedures.
02.0 Demonstrate proficiency in aircraft electrical systems and ground safety
03.0 Demonstrate proficiency in line and bench maintenance of airborne communication systems.
04.0 Demonstrate proficiency in installing avionics systems.
05.0 Demonstrate proficiency in the usage and adjustment of test equipment
06.0 Demonstrate proficiency in AM and FM transmitters.
07.0 Demonstrate proficiency in AM and FM receivers.
08.0 Demonstrate proficiency in AM and FM transceivers.
09.0 Demonstrate proficiency in electromagnetic wave emissions.
10.0 Demonstrate proficiency in line and bench maintenance of airborne radio navigation systems and equipment.
11.0 Demonstrate proficiency in line and bench maintenance of airborne radar systems.
12.0 Demonstrate proficiency in the principles of operation of area navigation (R-NAV) systems.
13.0 Demonstrate proficiency in the principles of Global Positioning Systems.

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

Course Description:
The Avionics Technical Publications Technician course is designed to build on the skills and knowledge students learned in the Electronics Equipment Repairer course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study avionics radio station regulations and procedures.

CTE Standards and Benchmarks	
01.0	Demonstrate proficiency in avionics radio station regulations and procedures--The student will be able to:
01.01	Define repair station related regulatory and standardization agencies and their purposes.
01.02	Define repair station certification requirements.
01.03	Define requirements for certification of radio repairmen.
01.04	Practice proper station operation procedures.
01.05	Prepare repair station reports and documentation.

Florida Department of Education
Student Performance Standards

Course Number: AVS0091
Occupational Completion Point: B
Avionics Installer – 180 Hours – SOC Code 49-2091

Course Description:
The Avionics Installer course is designed to build on the skills and knowledge students learned in the Avionics Technical Publications Technician course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study aircraft electrical systems, airborne communication systems, avionics installation, and test equipment.

CTE Standards and Benchmarks	
02.0	Demonstrate proficiency in aircraft electrical systems and ground safety--The student will be able to:
02.01	Define standard aircraft bus voltage.
02.02	Analyze aircraft electrical power generation and charging systems.
02.03	Analyze aircraft electrical power control and distribution systems.
02.04	Analyze aircraft electrical warning systems.
02.05	Analyze aircraft ground handling safety.
02.06	Describe and practice aircraft ground handling safety procedures pertaining to avionics maintenance.
03.0	Demonstrate proficiency in line and bench maintenance of airborne communication systems--The student will be able to:
03.01	Describe theory of operation of air to ground communication systems.
03.02	Determine serviceability through performance checks of avionics communication systems.
03.03	Troubleshoot to the component/module level malfunctioning communication systems/equipment.
03.04	Repair and return to service air to ground communication systems/equipment.
03.05	Analyze and troubleshoot communication transmitter switching and audio distribution circuits and equipment.
03.06	Describe the theory of operation of emergency locator transmitters (ELTs).
03.07	Perform preventative and regulatory maintenance and performance tests of ELTs.
03.08	Troubleshoot defective ELTs, repair and return to service.
04.0	Demonstrate proficiency in installing avionics systems--The student will be able to:
04.01	Draw an interconnecting diagram and interconnect an IFR Avionics system for a single engine or light twin aircraft using acceptable methods, techniques and practices.

CTE Standards and Benchmarks	
	04.02 Determine proper placement of the various antennas required for an IFR Avionics package on a light twin or single engine aircraft.
	04.03 Describe the effects of precipitation static on aircraft radios and standard methods of reduction.
	04.04 Compute the dimensions of an ADF Sense antenna for a typical installation.
	04.05 Apply the formula for weight and balance computation.
05.0	Demonstrate proficiency in the usage and adjustment of test equipment--The student will be able to:
	05.01 Describe the regulatory requirements for repair station test equipment calibration.
	05.02 Use and adjust frequency counters/meters.
	05.03 Use and adjust general-purpose multimeters.
	05.04 Use and adjust RF voltmeters.
	05.05 Use and adjust RF power meters, wattmeters, loads and attenuators.
	05.06 Use and adjust audio signal generators and power meters.
	05.07 Use and adjust oscilloscopes.
	05.08 Use and adjust power supplies.
	05.09 Use and adjust RF signal generators.
	05.10 Use and adjust special purpose test sets normally used in an Avionics Repair Station.

Florida Department of Education
Student Performance Standards

Course Number: AVS0092
Occupational Completion Point: C
Avionics Communication System Technician – 180 Hours – SOC Code 49-2091

Course Description:
The Avionics Communication System Technician course is designed to build on the skills and knowledge students learned in the Avionics Installer course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study AM and FM transmitters, receivers, transceivers, and electromagnetic wave emissions.

CTE Standards and Benchmarks	
06.0	Demonstrate proficiency in AM and FM transmitters--The student will be able to:
06.01	Define DSB, SSB and FM modulation.
06.02	Draw, analyze and troubleshoot AM and FM RF oscillator circuits.
06.03	Draw, analyze and troubleshoot buffer and multiplier circuits.
06.04	Draw, analyze and troubleshoot RF power amplifier circuits.
06.05	Draw, analyze and troubleshoot AM and FM modulation circuits.
06.06	Draw, analyze and troubleshoot microphone circuits.
06.07	Draw, analyze and troubleshoot balanced modulators and SSB filter circuits.
06.08	Draw, analyze and troubleshoot AM and FM power supply circuits.
06.09	Make power, frequency and modulation measurements of AM and FM transmitters.
06.10	Align and troubleshoot AM and FM transmitters.
06.11	Describe FCC rules pertaining to AM and FM transmitter maintenance and operation.
07.0	Demonstrate proficiency in AM and FM receivers--The student will be able to:
07.01	Draw, analyze and troubleshoot receiver audio voltage and power amplifiers and speaker/headphone circuits.
07.02	Draw, analyze and troubleshoot AM and FM detector circuits.
07.03	Draw, analyze and troubleshoot AM IF amplifier circuits.
07.04	Draw, analyze and troubleshoot FM IF amplifier and limited circuits.
07.05	Draw, analyze and troubleshoot receiver oscillator and AFC circuits.

CTE Standards and Benchmarks	
07.06	Draw, analyze and troubleshoot RF mixer/hetrodyne circuits.
07.07	Draw, analyze and troubleshoot receiver RF amplifier circuits.
07.08	Draw, analyze and troubleshoot AVC/AGC circuits.
07.09	Draw, analyze and troubleshoot receiver power supplies.
07.10	Make receiver sensitivity, selectivity, bandwidth, image rejection and adjacent channel rejection measurements.
07.11	Align and troubleshoot AM and FM receivers.
08.0	Demonstrate proficiency in AM and FM transceivers--The student will be able to:
08.01	Analyze and troubleshoot transceiver control, metering and switching circuits.
08.02	Analyze and troubleshoot transceiver frequency synthesizers and phase locked loop circuits.
08.03	Analyze and troubleshoot squelch circuits.
08.04	Align and troubleshoot transceivers.
09.0	Demonstrate proficiency in electromagnetic wave emissions--The student will be able to:
09.01	Define the radio frequency spectrum.
09.02	Define types and classification of RF emissions.
09.03	Define the characteristics of radio waves.
09.04	Define radio wave propagation method.
09.05	Define the basic types of antennas.
09.06	Draw the voltage and current relationships and radiation patterns for the basic types of antennas.
09.07	Solve signal strength problems and measure signal strength.
09.08	Solve problems pertaining to antenna length, propagation velocity and frequency.
09.09	Define methods for antenna tuning, gain and directivity.
09.10	Define transmission lines in terms of electrical and physical properties.
09.11	Define standing waves, cause and effect, and measure standing wave ratios.
09.12	Define tuned transmission lines and describe applications.
09.13	Draw voltage, current and impedance relationships for tuned transmission lines.
09.14	Compute transmission line losses.
09.15	Construct transmission lines.

CTE Standards and Benchmarks
09.16 Define waveguides, resonant cavities and their applications.

Florida Department of Education
Student Performance Standards

Course Number: AVS0093
Occupational Completion Point: D
Avionics Technician – 180 Hours – SOC Code 49-2091

Course Description:
The Avionics Technician course is designed to build on the skills and knowledge students learned in the Avionics Communication System Technician course for entry into the Avionics industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study airborne radio navigation systems, radar systems, R-NAV systems, and Global Positioning Systems.

CTE Standards and Benchmarks	
10.0	Demonstrate proficiency in line and bench maintenance of airborne radio navigation systems and equipment--The student will be able to:
10.01	Describe the principles and theory of operation of VHF omnirange receivers, converters and indicators.
10.02	Determine through performance checks, the serviceability of VHF omnirange systems.
10.03	Troubleshoot to the component/module level malfunctioning omnirange systems.
10.04	Repair and return to service omnirange systems equipment.
10.05	Describe the principles and theory of operation of instrument landing systems (ILS).
10.06	Determine through performance checks the serviceability of localizer, glideslope and marker beacon receivers, converters and indicators.
10.07	Troubleshoot to the component/module level malfunctioning ILS systems and equipment.
10.08	Repair and return to service ILS systems and equipment.
10.09	Describe the principles of operation of microwave landing systems.
10.10	Describe the principles and theory of operation of Automatic Direction Finders (ADF).
10.11	Determine through performance checks the serviceability of ADF systems.
10.12	Troubleshoot to the component/module level malfunctioning ADF systems.
10.13	Repair and return to service ADF systems.
10.14	Describe radio navigation systems/equipment interface with other aircraft instruments and systems.
11.0	Demonstrate proficiency in line and bench maintenance of airborne radar systems--The student will be able to:
11.01	Describe the principles and theory of operation of Air Traffic Control (ATC) transporters and altitude encoders.
11.02	Determine through performance checks the serviceability of ATC transponders and altitude encoders.

CTE Standards and Benchmarks	
	11.03 Troubleshoot to the component/module level ATC transponders.
	11.04 Repair and return to service ATC transponders.
	11.05 Describe the principles and theory of operation and Distance Measurements Equipment (DME).
	11.06 Determine through performance checks the serviceability of DME systems.
	11.07 Troubleshoot to the component/module level malfunctioning DME systems.
	11.08 Repair and return to service DME transponders.
	11.09 Describe the principles and basic theory of operation of weather radar systems.
	11.10 Describe the basic principles of operation of the 3M/RYAN Stormscope.
12.0	Demonstrate proficiency in the principles of operation of area navigation (R-NAV) systems--The student will be able to:
	12.01 Describe the principles of operation of VHF R-NAV systems (VOR-DME).
	12.02 Describe the principles of operation of Hyperbolic R-NAV systems (Loran C), (Omega/VAF) and Global Positioning Systems.
13.0	Demonstrate proficiency in the principles of Global Positioning Systems--The student will be able to:
	13.01 Describe the principles and basic theory of operation of Global Positioning Systems

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

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 – Career Preparatory	
Program Number	T650100
CIP Number	0647061305
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	DIESEL MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031 – Bus and Truck Mechanics and Diesel Engine Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

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

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

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 hours	49-3031
B	DIM0102	Diesel Electrical and Electronics Technician	300 hours	49-3031
C	DIM0104	Diesel Engine Technician	300 hours	49-3031
D	DIM0105	Diesel Brakes Technician	300 hours	49-3031

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Medium and Heavy Duty Bus and Truck program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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 Diagnosis and repair general electrical systems.
08.0 Diagnosis and repair battery systems.
09.0 Diagnosis and repair starting systems.
10.0 Diagnosis and repair charging systems
11.0 Diagnosis and repair lighting systems.
    11.01 Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights.
    11.02 Stoplights, turn signals, hazard lights, and back-up lights.
12.0 Diagnosis and repair gauges and warning devices.
13.0 Diagnosis and repair related electrical systems.
14.0 General engine diagnosis.
15.0 Cylinder head and valve train diagnosis and repair.
16.0 Engine block diagnosis and repair.
17.0 Lubrication systems diagnosis and repair.
18.0 Cooling system diagnosis and repair.
19.0 Air induction and exhaust systems diagnosis and repair.
20.0 Fuel system diagnosis and repair.
    20.01 Fuel supply system diagnosis and repair.
    20.02 Mechanical fuel injection diagnosis and repair.
    20.03 Electronic fuel management system diagnosis and repair.
21.0 Diagnosis and repair engine brakes.
22.0 Diagnosis and repair air supply and service systems.
23.0 Diagnosis and repair mechanical/foundation air brakes systems.
24.0 Diagnosis and repair parking brakes.
25.0 Diagnosis and repair hydraulic system.
26.0 Diagnosis and repair mechanical/foundation hydraulic brake systems.
27.0 Diagnosis and repair power assist units.
28.0 Diagnosis and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC).

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

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

CTE Standards and Benchmarks		Priority Number
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	
	e. Read a digital multimeter	

CTE Standards and Benchmarks		Priority Number
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.	

Florida Department of Education
Student Performance Standards

Course Number: DIM0102
Occupational Completion Point: B
Diesel Electrical and Electronics Technician – 300 Hours – SOC Code 49-3031

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

CTE Standards and Benchmarks		Priority Number
07.0	Diagnose and repair general electrical systems--The student will be able to:	
07.01	Read, interpret, and diagnose electrical/electronic circuits using wiring diagrams.	P-1
07.02	Check continuity in electrical/electronic circuits using appropriate test equipment.	P-1
07.03	Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM).	P-1
07.04	Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM) or clamp-on ammeter.	P-1
07.05	Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM).	P-1
07.06	Find shorts, grounds, and opens in electrical/electronic circuits.	P-1
07.07	Diagnose parasitic (key-off) battery drain problems.	P-1
07.08	Inspect and test fusible links, circuit breakers, relays, solenoids, and fuses; replace as needed.	P-2
07.09	Inspect and test spike suppression diodes/resistors; replace as needed.	P-3
08.0	Diagnose and repair battery systems--The student will be able to:	
08.01	Perform battery load test; determine needed action.	P-1
08.02	Determine battery state of charge using an open circuit voltage test.	P-2
08.03	Inspect, clean, and service battery; replace as needed.	P-2
08.04	Inspect and clean battery boxes, mounts, and hold downs; repair or replace as needed.	P-2
08.05	Charge battery using slow or fast charge method as appropriate.	P-2
08.06	Inspect, test, and clean battery cables and connectors; repair or replace as needed.	P-1

CTE Standards and Benchmarks			Priority Number
	08.07	Jump start a vehicle using jumper cables and a booster battery or auxiliary power supply using proper safety procedures.	P-1
	08.08	Perform battery capacitance test; determine needed action.	P-2
09.0	Diagnose and repair starting systems--The student will be able to:		
	09.01	Perform starter current draw test; determine needed action.	P-3
	09.02	Perform starter circuit cranking voltage and voltage drop tests; determine needed action.	P-1
	09.03	Inspect, test, and replace components (key switch, push button and/or magnetic switch) and wires in the starter control circuit.	P-2
	09.04	Inspect, test, and replace starter relays and solenoids/switches.	P-2
	09.05	Remove and replace starter; inspect flywheel ring gear or flex plate.	P-3
10.0	Diagnose and repair charging systems--The student will be able to:		
	10.01	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
	10.02	Diagnose the cause of a no charge, low charge, or overcharge condition; determine needed action.	P-1
	10.03	Inspect, adjust, and replace alternator drive belts, pulleys, fans, tensioners, and mounting brackets; adjust drive belts and check alignment.	P-1
	10.04	Perform charging system voltage and amperage output test; determine needed action.	P-1
	10.05	Perform charging circuit voltage drop tests; determine needed action.	P-1
	10.06	Remove and replace alternator.	P-3
	10.07	Inspect, repair, or replace connectors and wires in the charging circuit.	P-2
	10.08	Diagnose AC voltage leakage (failed rectifier) at alternator output; determine needed action.	P-1
11.0	Diagnose and repair lighting systems		
	11.01	Headlights, daytime running lights, parking, clearance, tail, cab, and instrument panel lights--The student will be able to:	
		11.01.1 Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.	P-1
		11.01.2 Test, aim, and replace headlights.	P-1
		11.01.3 Test headlight and dimmer circuit switches, relays, wires, terminals, connectors, sockets and control components; repair or replace as needed.	P-1
		11.01.4 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
		11.01.5 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

CTE Standards and Benchmarks			Priority Number
	11.01.6	Inspect and test interior cab light circuit switches, bulbs, sockets, connectors, terminals, and wires; repair or replace as needed.	P-2
	11.01.7	Inspect and test tractor-to-trailer multi-wire connector(s); repair or replace as needed.	P-1
11.02	Stoplights, turn signals, hazard lights, and back-up lights--The student will be able to:		
	11.02.1	Inspect, test, and adjust stoplight circuit switches, bulbs/LEDs, sockets, connectors, terminals, and wires; repair or replace as needed.	P-1
	11.02.2	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
	11.02.3	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
12.0	Diagnose and repair gauges and warning devices--The student will be able to:		
	12.01	Interface with vehicle's on-board computer; perform diagnostic procedure using recommended electronic diagnostic equipment and tools (including PC based software and/or data scan tools); determine needed action.	
	12.02	Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed action.	P-1
	12.03	Diagnose the cause of data bus-driven gauge malfunctions; determine needed action.	P-2
	12.04	Inspect and test gauge circuit sending units, gauges, connectors, terminals, and wires; repair or replace as needed.	P-2
	12.05	Inspect and test warning devices (lights and audible) circuit sending units, bulbs/LEDs, sockets, connectors, wires, and printed circuits/control modules; repair or replace as needed.	P-2
	12.06	Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.	P-2
13.0	Diagnose and repair related electrical systems--The student will be able to:		
	13.01	Diagnose the cause of constant, intermittent, or no horn operation; determine needed action.	P-2
	13.02	Inspect and test horn circuit relays, horns, switches, connectors, and wires; repair or replace as needed.	P-2
	13.03	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	P-2
	13.04	Inspect and test wiper motor, resistors, park switch, relays, switches, connectors, and wires; repair or replace as needed.	P-2
	13.05	Inspect wiper motor transmission linkage, arms, and blades; adjust or replace as needed.	P-2
	13.06	Inspect and test windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires; repair or replace as needed.	P-3
	13.07	Inspect and test sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires; repair or replace as needed.	P-3
	13.08	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

CTE Standards and Benchmarks		Priority Number
13.09	Inspect and test auxiliary power outlet, integral fuse, connectors, terminals, and wires; repair or replace as needed.	P-3
13.10	Diagnose the cause of slow, intermittent, or no power side window operation; determine needed action.	P-3
13.11	Inspect and test motors, switches, relays, connectors, terminals, and wires of power side window circuits; repair or replace as needed.	P-3
13.12	Inspect block heaters; determine needed repairs.	P-2
13.13	Inspect and test cruise control electrical components; repair or replace as needed.	P-3
13.14	Inspect and test engine cooling fan electrical control components; repair or replace as needed.	P-2
13.15	Diagnose cause of data buss communication problems; determine needed action.	P-3

Florida Department of Education
Student Performance Standards

Course Number: DIM0104
Occupational Completion Point: C
Diesel Engine Technician – 300 Hours – SOC Code 49-3031

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

CTE Standards and Benchmarks		Priority Number
14.0	General engine diagnosis--The student will be able to:	
14.01	Inspect fuel, oil, and coolant levels and condition, and consumption; determine needed action.	P-1
14.02	Diagnose causes of engine fuel, oil, coolant, air, and other leaks; determine needed action.	P-1
14.03	Interpret engine noises; determine needed action.	P-2
14.04	Observe engine exhaust smoke color and quantity; determine needed action.	P-1
14.05	Perform air intake system restriction and leakage tests; determine needed action.	P-1
14.06	Perform intake manifold pressure (boost) test; determine needed action.	P-1
14.07	Perform exhaust back pressure test; determine needed action.	P-2
14.08	Perform crankcase pressure test; determine needed action.	P-1
14.09	Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.	P-1
14.10	Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action.	P-1
14.11	Diagnose engine vibration problems; determine needed action.	P-2
14.12	Check, record, and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action.	P-1
14.13	Perform cylinder compression test; determine needed action.	P-3
15.0	Cylinder head and valve train diagnosis and repair--The student will be able to:	
15.01	Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly.	P-1
15.02	Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action.	P-1

CTE Standards and Benchmarks		Priority Number
15.03	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
15.04	Disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action.	P-3
15.05	Measure valve head height relative to deck, valve face-to-seat contact; determine needed action.	P-3
15.06	Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; perform needed action.	P-3
15.07	Inspect and adjust valve bridges (crossheads) and guides; perform needed action.	P-2
15.08	Reassemble cylinder head.	P-3
15.09	Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash.	P-2
15.10	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
15.11	Inspect cam followers; perform needed action.	P-2
15.12	Adjust valve clearance.	P-1
16.0	Engine block diagnosis and repair--The student will be able to:	
16.01	Remove, inspect, service, and install pans, covers, vents, gaskets, seals, and wear rings.	P-1
16.02	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
16.03	Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action.	P-3
16.04	Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action.	P-2
16.05	Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion).	P-2
16.06	Inspect in-block camshaft bearings for wear and damage; determine needed action.	P-3
16.07	Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play.	P-3
16.08	Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passages; check passage plugs; measure journal diameter; determine needed action.	P-2
16.09	Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and adjust crankshaft end play.	P-2
16.10	Inspect, install, and time gear train; measure gear backlash; determine needed action.	P-3
16.11	Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action.	P-2
16.12	Determine piston-to-cylinder wall clearance; check ring-to-groove clearance and end gap; install rings on pistons.	P-2
16.13	Assemble pistons and connecting rods; install in block; install rod bearings and check clearances.	P-2

CTE Standards and Benchmarks		Priority Number
16.14	Check condition of piston cooling jets (nozzles); determine needed action.	P-3
16.15	Inspect and measure crankshaft vibration damper; determine needed action.	P-3
16.16	Inspect, install, and align flywheel housing.	P-3
16.17	Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.	P-3
17.0	Lubrication systems diagnosis and repair--The student will be able to:	
17.01	Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; determine needed action.	P-1
17.02	Check engine oil level, condition, and consumption; determine needed action.	P-1
17.03	Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; determine needed action.	P-3
17.04	Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.	P-3
17.05	Inspect, clean, and test oil cooler and components; determine needed action.	P-3
17.06	Inspect turbocharger lubrication system; determine needed action.	P-2
17.07	Determine proper lubricant and perform oil and filter change.	P-1
18.0	Cooling system diagnosis and repair--The student will be able to:	
18.01	Check engine coolant type, level, condition, and consumption; determine needed action.	P-1
18.02	Test coolant temperature and check operation of temperature sensor, gauge, and/or sending unit; determine needed action.	P-2
18.03	Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.	P-1
18.04	Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.	P-2
18.05	Test coolant for freeze protection and additive package concentration; adjust as needed.	P-1
18.06	Recover, flush, and refill with recommended coolant/additive package; bleed cooling system.	P-1
18.07	Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.	P-1
18.08	Inspect water pump and hoses; replace as needed.	P-1
18.09	Inspect, clean, and pressure test radiator, pressure cap, tank(s), and recovery systems; determine needed action.	P-1
18.10	Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.	P-2
19.0	Air induction and exhaust systems diagnosis and repair--The student will be able to:	
19.01	Inspect turbocharger(s), wastegate, and piping systems; determine needed action.	P-2

CTE Standards and Benchmarks			Priority Number
19.02	Check air induction system: piping, hoses, clamps, and mounting; check for air restrictions and leaks; service or replace air filter as needed.		P-1
19.03	Remove and reinstall turbocharger/wastegate assembly.		P-2
19.04	Inspect intake manifold, gaskets, and connections; replace as needed.		P-3
19.05	Inspect, clean, and test charge air cooler assemblies; replace as needed.		P-2
19.06	Inspect exhaust manifold, piping, mufflers, and mounting hardware; repair or replace as needed.		P-2
19.07	Inspect and test preheater/inlet air heater, or glow plug system and controls; perform needed action.		P-2
20.0	Fuel system diagnosis and repair		
20.01	Fuel supply system diagnosis and repair--The student will be able to:		
	20.01.1	Check fuel level, quality, and consumption; determine needed action.	P-1
	20.01.2	Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, supply and return lines and fittings; determine needed action.	P-1
	20.01.3	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
	20.01.4	Inspect and test low pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings); determine needed action.	P-1
	20.01.5	Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump.	P-1
20.02	Mechanical fuel injection diagnosis and repair--The student will be able to:		
	20.02.1	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
	20.02.2	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
	20.02.3	Inspect and adjust throttle control linkage; determine needed action.	P-3
	20.02.4	Inspect air/fuel ratio control systems; determine needed action.	P-3
	20.02.5	Inspect, test, and adjust engine fuel shut-down devices and controls; determine needed action.	P-3
	20.02.6	Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed.	P-3
20.03	Electronic fuel management system diagnosis and repair--The student will be able to:		
	20.03.1	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

CTE Standards and Benchmarks			Priority Number
	20.03.2	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
	20.03.3	Locate and use relevant service information (to include diagnostic procedures, flow charts, and wiring diagrams).	P-1
	20.03.4	Inspect and replace electrical connector terminals, seals, and locks.	P-2
	20.03.5	Inspect and test switches, sensors, controls, actuator components, and circuits; adjust or replace as needed.	P-1
	20.03.6	Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters.	P-1
	20.03.7	Inspect, test, and adjust electronic unit injectors (EUI); determine needed action.	P-2
	20.03.8	Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable).	P-2
	20.03.9	Perform cylinder contribution test utilizing recommended electronic diagnostic tool.	P-1
	20.03.10	Perform engine timing sensor calibration (if applicable).	P-3
	20.03.11	Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) and system electronic controls; determine needed action.	P-2
	20.03.12	Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI) high pressure oil supply and control system; determine needed action.	P-2
	20.03.13	Perform on-engine inspections and tests on distributor-type injection pump electronic controls; determine needed action.	P-2
	20.03.14	Perform on-engine inspections and tests on in-line type injection pump electronic controls; determine needed action.	P-2
	20.03.15	Perform on-engine inspections and tests on common rail type injection systems; determine needed action.	P-3
21.0	Diagnose and repair engine brakes--The student will be able to:		
	21.01	Inspect and adjust engine compression/exhaust brakes; determine needed action.	P-2
	21.02	Inspect, test, and adjust engine compression/exhaust brake control circuits, switches, and solenoids; repair or replace as needed.	P-3
	21.03	Inspect engine compression/exhaust brake housing, valves, seals, screens, lines, and fittings; repair or replace as needed.	P-3

Florida Department of Education
Student Performance Standards

Course Number: DIM0105
Occupational Completion Point: D
Diesel Brakes Technician – 300 Hours – SOC Code 49-3031

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

CTE Standards and Benchmarks		Priority Number
Air Brakes Diagnosis and Repair		
22.0	Diagnose and repair air supply and service systems--The student will be able to:	
22.01	Diagnose poor stopping, air leaks, premature wear, pulling, grabbing, or dragging problems caused by supply and service system malfunctions; determine needed action.	P-1
22.02	Check air system build-up time; determine needed action.	P-1
22.03	Drain air reservoir tanks; check for oil, water, and foreign material; determine needed action.	P-1
22.04	Inspect, adjust, and align compressor drive belts, pulleys, and tensioners; replace as needed.	P-1
22.05	Inspect compressor drive gear and coupling; replace as needed.	P-3
22.06	Inspect air compressor, air cleaner/supply; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.	P-2
22.07	Inspect and test system pressure controls: governor, unloader assembly valves, intake screens, filters, lines, hoses, and fittings; replace as needed.	P-2
22.08	Inspect air system lines, hoses, fittings, and couplings; repair or replace as needed.	P-1
22.09	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
22.10	Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; repair or replace as needed.	P-1
22.11	Inspect and test brake application (foot) valve, fittings, and mounts; adjust or replace as needed.	P-1
22.12	Inspect and test stop light circuit switches, wiring, and connectors; repair or replace as needed.	P-1
22.13	Inspect and test hand brake (trailer) control valve, lines, fittings, and mountings; repair or replace as needed.	P-1
22.14	Inspect and test brake relay valve; replace as needed.	P-1
22.15	Inspect and test quick release valves; replace as needed.	P-1

CTE Standards and Benchmarks		Priority Number
22.16	Inspect and test front and rear axle limiting (proportioning) valves; replace as needed.	P-3
22.17	Inspect and test tractor protection valve; replace as needed.	P-1
22.18	Inspect and test emergency (spring) brake control/modulator valve(s); replace as needed.	P-1
22.19	Inspect and test low pressure warning devices, wiring, and connectors; replace as needed.	P-1
22.20	Inspect and test air pressure gauges, lines, and fittings; replace as needed.	P-2
23.0	Diagnose and repair mechanical/foundation air brake systems--The student will be able to:	
23.01	Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, or dragging problems caused by the foundation brake, slack adjuster, and brake chamber problems; determine needed action.	P-1
23.02	Inspect and test service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed.	P-1
23.03	Inspect and service manual and automatic slack adjusters; perform needed action.	P-1
23.04	Inspect camshafts, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor spins, and springs; replace as needed.	P-1
23.05	Inspect, clean, and adjust air disc brake caliper assemblies; determine needed repairs.	P-3
23.06	Inspect and measure brake shoes, linings, or pads; perform needed action.	P-1
23.07	Inspect and measure brake drums or rotors; perform needed action.	P-1
24.0	Diagnose and repair parking brakes--The student will be able to**:**	
24.01	Inspect and test parking (spring) brake chamber diaphragm and seals; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.	P-1
24.02	Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; replace as needed.	P-1
24.03	Inspect and test parking (spring) brake application and release valve; replace as needed.	P-2
24.04	Manually release (cage) and reset (uncage) parking (spring) brakes in accordance with manufacturers' recommendations.	P-1
Hydraulic Brakes Diagnosis and Repair		
25.0	Diagnose and repair hydraulic systems--The student will be able to:	
25.01	Diagnose poor stopping, premature wear, pulling, dragging or pedal feel problems caused by the hydraulic system; determine needed action.	P-1
25.02	Check and adjust brake pedal pushrod length.	P-3
25.03	Inspect and test master cylinder for internal/external leaks and damage; replace as needed.	P-1
25.04	Inspect for leaks and damage, brake lines, flexible hoses, and fittings; replace as needed.	P-1
25.05	Inspect and test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; replace as needed.	P-2

CTE Standards and Benchmarks		Priority Number
25.06	Inspect and test brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors; repair or replace as needed.	P-2
25.07	Inspect and clean wheel cylinders; replace as needed.	P-1
25.08	Inspect and clean disc brake caliper assemblies; replace as needed.	P-1
25.09	Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type.	P-1
25.10	Test and adjust brake stop light switch, bulbs, wiring, and connectors; repair or replace as needed.	P-1
26.0	Diagnose and repair mechanical/foundation hydraulic brake systems--The student will be able to:	
26.01	Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems; determine needed action.	P-1
26.02	Inspect and measure brake drums and rotors; perform needed action.	P-1
26.03	Inspect and measure drum brake shoes and linings; inspect mounting hardware, adjuster mechanisms, and backing plates; perform needed action.	P-1
26.04	Inspect and measure disc brake pads/linings; inspect mounting hardware; perform needed action.	P-1
26.05	Check parking brake operation; inspect parking brake applications and holding devices; adjust and replace as needed.	P-1
27.0	Diagnose and repair power assist units--The student will be able to:	
27.01	Diagnose poor stopping problems caused by the brake assist (booster) system; determine needed action.	P-2
27.02	Inspect, test, repair, or replace power brake assist (booster), hoses, and control valves; determine proper fluid type.	P-2
27.03	Check emergency (back-up, reserve) brake assist system.	P-2
28.0	Diagnose and repair air and hydraulic antilock brake systems (ABS) and automatic traction control (ATC)--The student will be able to:	
28.01	Observe antilock brake system (ABS) warning light operation (includes dash mounted trailer ABS warning light); determine needed action.	P-1
28.02	Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action.	P-1
28.03	Diagnose poor stopping and wheel lock-up caused by failure of the antilock brake system (ABS); determine needed action.	P-1
28.04	Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components; perform needed action.	P-1
28.05	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
28.06	Bleed the ABS hydraulic circuits following manufacturers' procedures.	P-2

CTE Standards and Benchmarks		Priority Number
28.07	Observe automatic traction control (ATC) warning light operation; determine needed action.	P-3
28.08	Diagnose automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC computer); determine needed action.	P-3

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

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 – Career Preparatory	
Program Number	T650200
CIP Number	0647061306
Grade Level	30, 31
Standard Length	750 hours
Teacher Certification	DIESEL MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031 – Bus and Truck Mechanics and Diesel Engine Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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

Program Structure

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

The courses may be taken in any sequence. However, an individual must take the Diesel Engine Preventive Maintenance Technician course (DIM0103).

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

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

OCP	Course Number	Course Title	Course Length	SOC Code
A	DIM0103	Diesel Engine Preventative Maintenance Technician	150 hours	49-3031
B	DIM0106	Diesel Heating and Air Conditioning Technician	150 hours	49-3031
C	DIM0107	Diesel Steering and Suspension Technician	150 hours	49-3031
D	DIM0108	Diesel Drivetrain Technician	150 hours	49-3031
E	DIM0109	Diesel Hydraulics Technician	150 hours	49-3031

National Standards

Programs identified as having Industry or National Standards corresponding to the standards and/or benchmarks for the Medium and Heavy Duty Bus and Truck program can be found using the following link:

http://www.natef.org/Achieving-Accreditation/Program-Standards.aspx

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Diagnose and repair engine systems.
- 01.01 Engine
- 01.02 Fuel system
- 01.03 Air induction and exhaust system
- 01.04 Cooling system
- 01.05 Lubrication system

02.0 Diagnose and repair cab and hood systems.
- 02.01 Instruments and controls
- 02.02 Safety equipment
- 02.03 Hardware
- 02.04 Heating, ventilation, and air conditioning (HVAC)

03.0 Diagnose and repair electrical/electronic systems.
- 03.01 Battery and starting systems
- 03.02 Charging system
- 03.03 Lighting system

04.0 Diagnose and repair frame and chassis systems.
- 04.01 Air brakes
- 04.02 Hydraulic brakes
- 04.03 Drivetrain
- 04.04 Suspension and steering systems
- 04.05 Tires and wheels
- 04.06 Frame and fifth wheel

05.0 HVAC systems diagnosis, service, and repair.

06.0 A/C system and component diagnosis, service, and repair.
- 06.01 A/C system – general.
- 06.02 Compressor and clutch.
- 06.03 Evaporator, condenser, and related components.
- 06.04 Heating and engine cooling systems diagnosis, service, and repair.

07.0 Operating systems and related controls diagnosis and repair.
- 07.01 Electrical
- 07.02 Air/vacuum/mechanical
- 07.03 Refrigerant recovery, recycling, and handling.

08.0 Steering systems diagnosis and repair.
- 08.01 Steering column
- 08.02 Steering units
- 08.03 Steering linkage

09.0 Suspension systems diagnosis and repair.

10.0 Wheel alignment diagnosis, adjustment, and repair.

11.0 Wheels and tires diagnosis and repair.
12.0 Frame service and repair.
13.0 Clutch diagnosis and repair.
14.0 Transmission diagnosis and repair.
15.0 Driveshaft and universal joint diagnosis and repair.
16.0 Drive axle diagnosis and repair.

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.

17.0 General hydraulic system diagnosis and repair.
18.0 Diagnose and repair hydraulic pumps.
19.0 Diagnose and repair hydraulic filtration/reservoirs (tanks).
20.0 Diagnose and repair hydraulic hoses, fittings, and connections.
21.0 Diagnose and repair hydraulic control valves.
22.0 Diagnose and repair hydraulic actuators.

Florida Department of Education
Student Performance Standards

Course Number: DIM0103
Occupational Completion Point: A
Diesel Engine Preventative Maintenance Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Engine Preventative Maintenance Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study engine system, cab and hood systems, electrical/electronic systems, frame and chassis systems diagnostics, service, and repair.

CTE Standards and Benchmarks			Priority Number
01.0	Diagnose and repair engine systems		
01.01	Engine--The student will be able to:		
01.01.1	Check engine starting/operation (including unusual noises, vibrations, exhaust smoke, etc.); record idle and governed.		P-1
01.01.2	Inspect vibration damper.		P-1
01.01.3	Inspect belts, tensioners, and pulleys; check and adjust belt tension; check belt alignment.		P-1
01.01.4	Check engine oil level; check engine for oil, coolant, and fuel leaks (Engine Off).		P-1
01.01.5	Inspect engine mounts for looseness and deterioration.		P-1
01.01.6	Check engine for oil, coolant, air, fuel and exhaust leaks (Engine Running).		P-1
01.01.7	Check electrical wiring, routing, and hold-down clamps, including Engine Control Module/Powertrain Control Module (ECM/PCM).		P-1
01.02	Fuel system--The student will be able to:		
01.02.1	Check fuel tanks, mountings, lines, caps, and vents.		P-1
01.02.2	Inspect throttle linkages and return springs.		P-1
01.02.3	Drain water from fuel system.		P-1
01.02.4	Inspect water separator/fuel heater; replace fuel filter(s); prime and bleed fuel system.		P-1
01.03	Air induction and exhaust system--The student will be able to:		
01.03.1	Check exhaust system mountings for looseness and damage.		P-1
01.03.2	Check engine exhaust system for leaks, proper routing, and damaged or missing components to include exhaust gas recirculation (EGR) system if equipped.		P-1

CTE Standards and Benchmarks			Priority Number
	01.03.3	Check air induction system: piping, charge air cooler, hoses, clamps, and mountings; check for air restrictions and leaks.	P-1
	01.03.4	Inspect turbocharger for leaks; check mountings and connections.	P-1
	01.03.5	Check operation of engine compression/exhaust brake.	P-1
	01.03.6	Service or replace air filter as needed; check and reset air filter restriction indicator.	P-1
01.04	Cooling system--The student will be able to:		
	01.04.1	Check operation of fan clutch.	P-1
	01.04.2	Inspect radiator (including air flow restriction, leaks, and damage) and mountings.	P-1
	01.04.3	Inspect fan assembly and shroud.	P-1
	01.04.4	Pressure test cooling system and radiator cap.	P-1
	01.04.5	Inspect coolant hoses and clamps.	P-1
	01.04.6	Inspect coolant recovery system.	P-1
	01.04.7	Check coolant for contamination, supplemental coolant additives (SCA) concentration, and protection level (freeze point).	P-1
	01.04.8	Service coolant filter/conditioner.	P-1
	01.04.9	Inspect water pump for leaks and bearing play.	P-1
01.05	Lubrication system--The student will be able to:		
	01.05.1	Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.	P-1
	01.05.2	Take an engine oil sample.	P-1
02.0	Diagnose and repair cab and hood systems		
02.01	Instruments and controls--The student will be able to:		
	02.01.1	Inspect key condition and operation of ignition switch.	P-1
	02.01.2	Check warning indicators.	P-1
	02.01.3	Check instruments; record oil pressure and system voltage.	P-1
	02.01.4	Check mechanical, electronic, and emergency shut down operation.	P-1
	02.01.5	Check mechanical and electronic engine speed controls.	P-1
	02.01.6	Check heater, ventilation, and air conditioning (HVAC) controls.	P-1
	02.01.7	Check operation of all accessories.	P-1

CTE Standards and Benchmarks			Priority Number
	02.01.8	Using diagnostic tool or on-board diagnostic system; extract engine monitoring information.	P-1
02.02	Safety equipment--The student will be able to:		
	02.02.1	Check operation of electric/air horns and back-up warning devices.	P-1
	02.02.2	Check condition and documentation of safety flares, spare fuses, triangles, fire extinguisher, and all required decals.	P-1
	02.02.3	Inspect seat belts and sleeper restraints.	P-1
	02.02.4	Inspect wiper blades and arms.	P-1
02.03	Hardware--The student will be able to:		
	02.03.1	Check wiper and washer operation.	P-1
	02.03.2	Inspect windshield glass for cracks or discoloration; check sun visor.	P-1
	02.03.3	Check seat condition, operation, and mounting.	P-1
	02.03.4	Check door glass and window operation.	P-1
	02.03.5	Inspect steps and grab handles.	P-1
	02.03.6	Inspect mirrors, mountings, brackets, and glass.	P-1
	02.03.7	Record all observed physical damage.	P-1
	02.03.8	Lubricate all cab and hood grease fittings.	P-1
	02.03.9	Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.	P-1
	02.03.10	Inspect cab mountings, hinges, latches, linkages and ride height; service as needed.	P-1
	02.03.11	Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect safety devices; service as needed.	P-1
02.04	Heating, ventilation, and air conditioning (HVAC)--The student will be able to:		
	02.04.1	Inspect A/C condenser and lines for condition and visible leaks; check mountings.	P-1
	02.04.2	Inspect A/C compressor and lines for condition and visible leaks; check mountings.	P-1
	02.04.3	Check A/C system condition and operation; check A/C monitoring system, if applicable.	P-1
	02.04.4	Check HVAC air inlet filters and ducts; service as needed.	P-1
03.0	Diagnose and repair electrical/electronic systems		
03.01	Battery and starting systems--The student will be able to:		
	03.01.1	Inspect battery box(es), cover(s), and mountings.	P-1

CTE Standards and Benchmarks			Priority Number
	03.01.2	Inspect battery hold-downs, connections, cables, and cable routing; service as needed.	P-1
	03.01.3	Check/record battery state-of-charge (open circuit voltage) and condition.	P-1
	03.01.4	Perform battery test (load and/or capacitance).	P-1
	03.01.5	Inspect starter, mounting, and connections.	P-1
	03.01.6	Engage starter; check for unusual noises, starter drag, and starting difficulty.	P-1
03.02	Charging system--The student will be able to:		
	03.02.1	Inspect alternator, mountings, wiring and wiring routing; determine needed action.	P-1
	03.02.2	Perform alternator current output test.	P-1
	03.02.3	Perform alternator voltage output test.	P-1
03.03	Lighting system--The student will be able to:		
	03.03.1	Check operation of interior lights; determine needed action.	P-1
	03.03.2	Check all exterior lights, lenses, reflectors, and conspicuity tape; check headlight alignment; determine needed action.	P-1
	03.03.3	Inspect and test tractor-to-trailer multi-wire connector(s), cable(s), and holder(s); determine needed action.	P-1
04.0	Diagnose and repair frame and chassis systems		
04.01	Air brakes--The student will be able to:		
	04.01.1	Check parking brake operation.	P-1
	04.01.2	Record air governor cut-out setting (psi).	P-1
	04.01.3	Check air drier drain valve operation.	P-1
	04.01.4	Check air system for leaks (brakes released).	P-1
	04.01.5	Check air system for leaks (brakes applied).	P-1
	04.01.6	Test one-way and double-check valves.	P-1
	04.01.7	Check low air pressure warning devices.	P-1
	04.01.8	Check air governor cut-in pressure.	P-1
	04.01.9	Check emergency (spring) brake control/modulator valve, if applicable.	P-1
	04.01.10	Check tractor protection valve.	P-1
	04.01.11	Test air pressure build-up time.	P-1
	04.01.12	Inspect coupling air lines, holders, and gladhands.	P-1

CTE Standards and Benchmarks		Priority Number
04.01.13	Check brake chambers and air lines for secure mounting and damage.	P-1
04.01.14	Service air drier.	P-1
04.01.15	Inspect and record brake lining/pad condition, thickness, and contamination.	P-1
04.01.16	Inspect and record condition of brake drums/rotors.	P-1
04.01.17	Check operation of brake manual slack adjusters; adjust as needed.	P-1
04.01.18	Check operation and adjustment of brake automatic slack adjusters.	P-1
04.01.19	Lubricate all brake component grease fittings.	P-1
04.01.20	Check condition and operation of hand brake (trailer) control valve.	P-1
04.01.21	Perform antilock brake system (ABS) operational system self-test.	P-1
04.01.22	Drain air tanks and check for contamination.	P-1
04.01.23	Check condition of pressure relief (safety) valves.	P-1
04.02	Hydraulic brakes--The student will be able to:	
04.02.1	Check master cylinder fluid level and condition.	P-1
04.02.2	Inspect brake lines, fittings, flexible hoses, and valves for leaks and damage.	P-1
04.02.3	Check parking brake operation; inspect parking brake application and holding devices; adjust as needed.	P-1
04.02.4	Check operation of hydraulic system: pedal travel, pedal effort, pedal feel (drift).	P-1
04.02.5	Inspect wheel cylinders/calipers for leakage and damage.	P-1
04.02.6	Inspect power brake booster(s), hoses; and check/control valves; check power brake booster, reservoir fluid level and condition.	P-1
04.02.7	Inspect and record brake lining/pad condition and thickness, and contamination.	P-1
04.02.8	Inspect and record condition of brake drums/rotors.	P-1
04.02.9	Adjust drum brakes.	P-1
04.03	Drivetrain--The student will be able to:	
04.03.1	Check operation of clutch, clutch brake, and gearshift.	P-1
04.03.2	Check clutch linkage/cable for looseness or binding, if applicable.	P-1
04.03.3	Check hydraulic clutch slave and master cylinders, lines, fittings, and hoses, if applicable.	P-1
04.03.4	Check clutch adjustment; adjust as needed.	P-1
04.03.5	Check transmission case, seals, filter, hoses, and cooler for cracks and leaks.	P-1

CTE Standards and Benchmarks		Priority Number
04.03.6	Inspect transmission breather.	P-1
04.03.7	Inspect transmission mounts.	P-1
04.03.8	Check transmission oil level, type, and condition.	P-1
04.03.9	Inspect U-joints, yokes, drive lines, and center bearings for looseness, damage, and proper phasing.	P-1
04.03.10	Inspect axle housing(s) for cracks and leaks.	P-1
04.03.11	Inspect axle breather(s).	P-1
04.03.12	Lubricate all drivetrain grease fittings.	P-1
04.03.13	Check drive axle(s) oil level, type, and condition.	P-1
04.03.14	Change drive axle(s) oil and filter; check and clean magnetic plugs.	P-1
04.03.15	Check two-speed axle unit operation and oil level.	P-1
04.03.16	Change transmission oil and filter; check and clean magnetic plugs.	P-1
04.03.17	Check interaxle differential lock operation.	P-1
04.03.18	Check range shift operation.	P-1
04.04	Suspension and steering systems--The student will be able to:	
04.04.1	Check steering wheel operation for free play or binding.	P-1
04.04.2	Check power steering pump, mounting, and hoses for leaks, condition, and routing; check fluid level.	P-1
04.04.3	Change power steering fluid and filter.	P-1
04.04.4	Inspect steering gear for leaks and secure mounting.	P-1
04.04.5	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
04.04.6	Check king pin wear.	P-1
04.04.7	Check wheel bearings for looseness and noise.	P-1
04.04.8	Check oil level and condition in all non-drive hubs; check for leaks.	P-1
04.04.9	Remove and inspect wheel bearings; reassemble and adjust.	P-1
04.04.10	Inspect springs, hangers, shackles, spring U-bolts, and insulators.	P-1
04.04.11	Inspect shock absorbers for leaks and secure mounting.	P-1
04.04.12	Inspect air suspension springs, mounts, hoses, valves, linkage, and fittings for leaks and damage.	P-1

CTE Standards and Benchmarks		Priority Number
04.04.13	Check and record suspension ride height.	P-1
04.04.14	Lubricate all suspension and steering grease fittings.	P-1
04.04.15	Check toe adjustment.	P-1
04.04.16	Check tandem axle alignment and spacing.	P-1
04.04.17	Check axle locating components (radius, torque, and/or track rods).	P-1
04.05	Tires and wheels--The student will be able to:	
04.05.1	Inspect tires for irregular wear patterns and proper mounting of directional tires.	P-1
04.05.2	Inspect tires for cuts, cracks, bulges, and sidewall damage.	P-1
04.05.3	Inspect valve caps and stems; replace as needed.	P-1
04.05.4	Measure and record tread depth; probe for imbedded debris.	P-1
04.05.5	Check and record air pressure; adjust air pressure in accordance with manufacturers' specifications.	P-1
04.05.6	Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed.	P-1
04.05.7	Retorque lugs in accordance with manufacturer's specifications.	P-1
04.05.8	Inspect wheels and spacers for cracks or damage.	P-1
04.05.9	Check tire matching (diameter and tread) on dual tire installations.	P-1
04.06	Frame and fifth wheel--The student will be able to:	
04.06.1	Inspect fifth wheel mounting bolts, air lines, and locks.	P-1
04.06.2	Test operation of fifth wheel locking device; adjust if necessary.	P-1
04.06.3	Check mud flaps and brackets.	P-1
04.06.4	Check pintle hook assembly and mounting.	P-1
04.06.5	Lubricate all fifth wheel grease fittings and plate.	P-1
04.06.6	Inspect frame and frame members for cracks and damage.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0106
Occupational Completion Point: B
Diesel Heating and Air Conditioning Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Heating and Air Conditioning Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of HVAC, and A/C systems.

CTE Standards and Benchmarks			Priority Number
05.0	HVAC systems diagnosis, service, and repair--The student will be able to:		
	05.01 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action.		P-1
	05.02 Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine needed action.		P-1
	05.03 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
06.0	A/C system and component diagnosis, service, and repair		
	06.01 A/C system - general--The student will be able to:		
	06.01.1	Diagnose the cause of temperature control problems in the A/C system; determine needed action.	P-1
	06.01.2	Identify refrigerant type and check for contamination; determine needed action.	P-2
	06.01.3	Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action.	P-1
	06.01.4	Diagnose A/C system problems indicated by visual, audible, smell, and touch procedures; determine needed action.	P-1
	06.01.5	Perform A/C system leak test; determine needed action.	P-1
	06.01.6	Evacuate A/C system using appropriate equipment.	P-1
	06.01.7	Internally clean contaminated A/C system components and hoses.	P-2
	06.01.8	Charge A/C system with refrigerant.	P-1
	06.01.9	Identify lubricant type needed for system application.	P-1
	06.02 Compressor and clutch--The student will be able to:		
	06.02.1	Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed action.	P-1

CTE Standards and Benchmarks			Priority Number
	06.02.2	Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices.	P-2
	06.02.3	Inspect, and replace A/C compressor drive belts, pulleys, and tensioners; adjust belt tension and check alignment.	P-1
	06.02.4	Inspect, test, service, and replace A/C compressor clutch components or assembly.	P-3
	06.02.5	Inspect and correct A/C compressor lubricant level (if applicable).	P-2
	06.02.6	Inspect, test, and replace A/C compressor.	P-2
	06.02.7	Inspect, repair, or replace A/C compressor mountings and hardware.	P-2
06.03	Evaporator, condenser, and related components--The student will be able to:		
	06.03.1	Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses.	P-1
	06.03.2	Inspect A/C system hoses, lines, filters, fittings, and seals; determine needed action.	P-1
	06.03.3	Inspect A/C condenser for proper air flow.	P-1
	06.03.4	Inspect and test A/C system condenser and mountings; determine needed action.	P-2
	06.03.5	Inspect and replace receiver/drier or accumulator/drier.	P-1
	06.03.6	Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action.	P-3
	06.03.7	Inspect and replace orifice tube.	P-1
	06.03.8	Inspect and test cab/sleeper evaporator core; determine needed action.	P-3
	06.03.9	Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter.	P-1
	06.03.10	Identify and inspect A/C system service ports (gauge connections); determine needed action.	P-1
	06.03.11	Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action.	P-2
06.04	Heating and engine cooling systems diagnosis, service, and repair--The student will be able to:		
	06.04.1	Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action.	P-1
	06.04.2	Diagnose window fogging problems; determine needed action.	P-1
	06.04.3	Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature, and conditioner concentration; determine needed action.	P-2
	06.04.4	Inspect engine cooling and heating system hoses, lines, and clamps; determine needed action.	P-1
	06.04.5	Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed action.	P-1

CTE Standards and Benchmarks			Priority Number
	06.04.6	Inspect water pump for leaks and bearing play; determine needed action.	P-2
	06.04.7	Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs.	P-2
	06.04.8	Recover, flush and refill with recommended coolant/additive package; bleed cooling system.	P-1
	06.04.9	Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; replace as needed.	P-2
	06.04.10	Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action.	P-2
	06.04.11	Inspect and flush heater core; determine needed action.	P-2
07.0	Operating systems and related controls diagnosis and repair		
	07.01	Electrical--The student will be able to:	
	07.01.1	Diagnose the cause of failures in HVAC electrical control systems; determine needed action.	P-1
	07.01.2	Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices; determine needed action.	P-2
	07.01.3	Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices; determine needed action.	P-2
	07.01.4	Inspect and test A/C-related electronic engine control systems; determine needed action.	P-2
	07.01.5	Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors wiring, and protection devices; determine needed action.	P-2
	07.01.6	Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices; determine needed action.	P-3
	07.01.7	Inspect and test HVAC system electrical control panel assemblies; determine needed action.	P-3
	07.02	Air/vacuum/mechanical--The student will be able to:	
	07.02.1	Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed action.	P-1
	07.02.2	Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action.	P-3
	07.02.3	Inspect, test, and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action.	P-3
	07.02.4	Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action.	P-3
	07.02.5	Inspect and test HVAC system vacuum reservoir(s), check valve(s), and restrictors; determine needed action.	P-3
	07.02.6	Inspect, test, and adjust HVAC system ducts, doors, and outlets; determine needed action.	P-3

CTE Standards and Benchmarks		Priority Number
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.		
07.03	Refrigerant recovery, recycling, and handling--The student will be able to:	
07.03.1	Maintain and verify correct operation of certified equipment.	P-1
07.03.2	Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.	P-1
07.03.3	Recycle refrigerant.	P-1
07.03.4	Handle, label, and store refrigerant.	P-1
07.03.5	Test recycled refrigerant for non-condensable gases.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0107
Occupational Completion Point: C
Diesel Steering and Suspension Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Steering and Suspension Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of steering, suspension, wheel alignment, wheels, tires, and frame systems.

CTE Standards and Benchmarks			Priority Number
08.0	Steering systems diagnosis and repair		
	08.01	Steering column--The student will be able to:	
	08.01.1	Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed action.	P-1
	08.01.2	Inspect steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints; determine needed action.	P-1
	08.01.3	Check and adjust cab mounting and ride height.	P-3
	08.01.4	Center the steering wheel as needed.	P-1
	08.01.5	Disable and enable supplemental restraint system (SRS) in accordance with manufacturers' procedures.	P-1
	08.02	Steering units--The student will be able to:	
	08.02.1	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
	08.02.2	Determine recommended type of power steering fluid; check level and condition; determine needed action.	P-1
	08.02.3	Flush and refill power steering system; purge air from system.	P-2
	08.02.4	Perform power steering system pressure, temperature, and flow tests; determine needed action.	P-2
	08.02.5	Inspect, service, or replace power steering reservoir including filter, seals, and gaskets.	P-2
	08.02.6	Inspect, and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.	P-1
	08.02.7	Inspect, replace as required, power steering pump drive gear and coupling.	P-3
	08.02.8	Inspect, adjust, or replace power steering pump, mountings, and brackets.	P-3

CTE Standards and Benchmarks			Priority Number
	08.02.9	Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, hose routings, and fittings.	P-3
	08.02.10	Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system).	P-3
	08.02.11	Inspect, adjust, repair, or replace integral type power steering gear and mountings.	P-1
	08.02.12	Adjust manual and automatic steering gear poppet/relief valves.	P-2
08.03	Steering linkage--The student will be able to:		
	08.03.1	Inspect and align pitman arm; replace as needed.	P-1
	08.03.2	Inspect drag link (relay rod) and tie rod ends; adjust or replace as needed.	P-1
	08.03.3	Inspect steering arm and levers, and linkage pivot joints; replace as needed.	P-1
	08.03.4	Inspect clamps and retainers on cross tube/relay rod/centerline/tie rod; position or replace as needed.	P-1
	08.03.5	Check and adjust wheel stops.	P-1
	08.03.6	Lubricate steering linkage joints as needed.	P-1
09.0	Suspension systems diagnosis and repair--The student will be able to:		
09.01	Inspect front axles, U-bolts, and nuts; determine needed action.		P-1
09.02	Inspect and service king pin, steering knuckle bushings, locks, bearings, seals, and covers; determine needed action.		P-1
09.03	Inspect shock absorbers, bushings, brackets, and mounts; replace as needed.		P-1
09.04	Inspect leaf springs, center bolts, clips, eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts; determine needed action.		P-1
09.05	Inspect torque arms, bushings, and mounts; determine needed action.		P-1
09.06	Inspect axle aligning devices such as radius rods, track bars, stabilizer bars, and related bushings, mounts, shims, and cams; determine needed action.		P-1
09.07	Inspect walking beams, center (cross) tube, bushings, mounts, load pads, and saddles/caps; replace as needed.		P-3
09.08	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
09.09	Inspect and test air springs, mounting plates, springs, suspension arms, and bushings; replace as needed.		P-1
09.10	Measure vehicle ride height; determine needed action.		P-1
09.11	Diagnose rough ride problems; determine needed action.		P-3
10.0	Wheel alignment diagnosis, adjustment, and repair--The student will be able to:		

CTE Standards and Benchmarks		Priority Number
10.01	Diagnose vehicle wandering, pulling, shimmy, hard steering and off-center steering wheel problem(s); adjust and repair as needed.	P-1
10.02	Check camber; determine needed action.	P-2
10.03	Check caster; adjust as needed.	P-2
10.04	Check toe; adjust as needed.	P-1
10.05	Check rear axle(s) alignment (thrust line/centerline) and tracking; adjust or repair as needed.	P-2
10.06	Diagnose turning/Ackerman angle (toe-out-on-turns) problems; determine needed action.	P-3
10.07	Check front axle alignment (centerline); adjust or repair as needed.	P-2
11.0	Wheels and tires diagnosis and repair--The student will be able to:	
11.01	Diagnose unusual tire wear patterns, check tread depth, mismatched tread design; determine needed action.	P-1
11.02	Diagnose wheel/tire vibration, shimmy, pounding, hop (tramp) problems; determine needed action.	P-2
12.0	Frame service and repair--The student will be able to:	P-1
12.01	Inspect and adjust fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts; determine needed action.	P-1
12.02	Inspect sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.	P-1
12.03	Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed repairs.	P-1
12.04	Inspect, install, or repair frame hangers, brackets, and crossmembers in accordance with manufacturers' recommended procedures.	P-3
12.05	Inspect, repair or replace pintle hooks and draw bars.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0108
Occupational Completion Point: D
Diesel Drivetrain Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Drivetrain Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of clutch, transmission, driveshaft, universal joint, and drive axle systems.

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

CTE Standards and Benchmarks		Priority Number
13.0	Clutch diagnosis and repair--The student will be able to:	
13.01	Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action.	P-1
13.02	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
13.03	Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.	P-2
13.04	Inspect, adjust, lubricate or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals.	P-1
13.05	Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc.	P-2
13.06	Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs.	P-1
13.07	Inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action.	P-1
13.08	Inspect, adjust, and replace self-adjusting/continuous-adjusting clutch mechanisms.	P-2
13.09	Inspect and replace pilot bearing.	P-1
13.10	Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action.	P-1
13.11	Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action.	P-1
13.12	Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed action.	P-1

CTE Standards and Benchmarks		Priority Number
14.0	Transmission diagnosis and repair--The student will be able to:	
14.01	Diagnose transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action.	P-1
14.02	Diagnose transmission component failure cause, both before and during disassembly procedures; determine needed action.	P-2
14.03	Inspect, adjust, service, repair, or replace transmission remote shift linkages, brackets, bushings, pivots, and levers.	P-2
14.04	Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.	P-1
14.05	Inspect and replace transmission mounts, insulators, and mounting bolts; determine needed action.	P-3
14.06	Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed.	P-1
14.07	Check transmission fluid level and condition; determine needed service; add proper type of lubricant.	P-1
14.08	Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires.	P-2
14.09	Remove and reinstall transmission.	P-1
14.10	Inspect input shaft, gear, spacers, bearings, retainers, and slingers; replace as needed.	P-3
14.11	Inspect and adjust main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive assemblies, retainers, and keys; replace as needed.	P-3
14.12	Inspect countershafts, gears, bearings, retainers, and keys; adjust bearing preload and time multiple countershaft gears; replace as needed.	P-3
14.13	Inspect output shafts, gears, washers, spacers, bearings, retainers, and keys; replace as needed.	P-3
14.14	Inspect and/or replace reverse idler shafts, gears, bushings, bearings, thrust washers, and retainers; check reverse idler gear end play (where applicable).	P-3
14.15	Inspect synchronizer hub, sleeve, keys (inserts), springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; replace as needed.	P-3
14.16	Inspect transmission cases including surfaces, bores, bushings, pins, studs, and magnets; replace as needed.	P-3
14.17	Inspect transmission lubrication system pumps, troughs, collectors, and slingers; service or replace as needed.	P-3
14.18	Inspect transmission oil filters and coolers; replace as needed.	P-2
14.19	Inspect mechanical and electronic speedometer components; determine needed action.	P-2
14.20	Inspect and adjust power take-off (PTO) assemblies, controls, and shafts; perform needed action.	P-3
14.21	Inspect and test function of backup light, neutral start, and warning device circuits; repair as needed.	P-1
14.22	Inspect and test transmission temperature gauge sending unit/sensor; determine needed action.	P-2

CTE Standards and Benchmarks		Priority Number
14.23	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
14.24	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
14.25	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
14.26	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
14.27	Inspect, test operation, repair, or replace automated mechanical transmission electronic shift selectors, switches, displays and indicators, wiring harnesses.	P-2
14.28	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
15.0	Driveshaft and universal joint diagnosis and repair--The student will be able to:	
15.01	Diagnose driveshaft and universal joint noise and vibration problems; determine needed action.	P-1
15.02	Inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints; check phasing of all yokes.	P-1
15.03	Inspect and replace driveshaft center support bearings and mounts; determine needed action.	P-1
15.04	Measure and adjust drive line angles.	P-1
16.0	Drive axle diagnosis and repair--The student will be able to:	
16.01	Diagnose drive axle(s) drive unit noise and overheating problems; determine needed action.	P-2
16.02	Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals.	P-1
16.03	Check drive axle fluid level and condition; determine needed service; add proper type of lubricant.	P-1
16.04	Remove and replace differential carrier assembly.	P-2
16.05	Inspect and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings.	P-3
16.06	Inspect and replace components of locking differential case assembly.	P-3
16.07	Inspect differential carrier case and caps, side bearing bores, and pilot (spigot, pocket) bearing bore; determine needed action.	P-3
16.08	Measure ring gear runout; determine needed action.	P-3

CTE Standards and Benchmarks		Priority Number
16.09	Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings.	P-3
16.10	Measure and adjust drive pinion bearing preload.	P-3
16.11	Measure and adjust drive pinion depth.	P-3
16.12	Measure and adjust side bearing preload and ring gear backlash.	P-3
16.13	Check and interpret ring gear and pinion tooth contact pattern; determine needed action.	P-3
16.14	Inspect, adjust, or replace ring gear thrust block/bolt.	P-3
16.15	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
16.16	Inspect, repair, or replace 2-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines, and connectors.	P-3
16.17	Inspect power divider (inter-axle differential) assembly; determine needed action.	P-3
16.18	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
16.19	Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters.	P-3
16.20	Inspect and replace drive axle shafts.	P-1
16.21	Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action.	P-1
16.22	Diagnose drive axle for wheel bearing noise and damage; perform needed action.	P-1
16.23	Inspect and test drive axle temperature gauge sending unit/sensor; determine needed action.	P-2
16.24	Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings.	P-1

Florida Department of Education
Student Performance Standards

Course Number: DIM0109
Occupational Completion Point: E
Diesel Hydraulics Technician – 150 Hours – SOC Code 49-3031

Course Description:
The Diesel Hydraulics Technician course prepares students for entry into the Diesel Engine Service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study diagnostic, service, and repair of hydraulic, pumps, filtration/reservoir, hoses, fittings, connectors, control valves, and actuator systems.

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.

CTE Standards and Benchmarks		Priority Number
17.0	General hydraulic system diagnosis and repair--The student will be able to:	
17.01	Identify system type (closed and open) and verify proper operation.	P-1
17.02	Read and interpret system diagrams and schematics.	P-1
17.03	Perform system temperature, pressure, flow, and cycle time tests; determine needed action.	P-1
17.04	Verify placement of equipment /component safety labels and placards; determine needed action.	P-1
18.0	Diagnose and repair hydraulic pumps--The student will be able to:	
18.01	Identify system fluid type.	P-1
18.02	Identify causes of pump failure, unusual pump noises, and temperature, flow, and leakage problems; determine needed action.	P-2
18.03	Determine pump type, rotation, and drive system.	P-2
18.04	Remove and install pump; prime and/or bleed system.	P-2
18.05	Inspect pump inlet for restrictions and leaks; determine needed action.	P-2
18.06	Inspect pump outlet for restrictions and leaks; determine needed action.	P-2

CTE Standards and Benchmarks		Priority Number
19.0	Diagnose and repair hydraulic filtration/reservoirs (tanks)--The student will be able to:	
19.01	Identify type of filtration system; verify filter application and flow direction.	P-1
19.02	Service filters and breathers.	P-1
19.03	Identify causes of system contamination; determine needed action.	P-2
19.04	Take a hydraulic oil sample.	P-2
19.05	Check reservoir fluid level and condition; determine needed action.	P-1
19.06	Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines.	P-2
20.0	Diagnose and repair hydraulic hoses, fittings, and connections--The student will be able to:	
20.01	Diagnose causes of component leakage, damage, and restriction; determine needed action.	P-2
20.02	Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed.	P-1
20.03	Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications; use proper procedures to avoid contamination.P-2	P-2
20.04	Inspect and replace fitting seals and sealants.	P-2
21.0	Diagnose and repair hydraulic control valves--The student will be able to:	
21.01	Pressure test system safety relief valve; determine needed action.	P-2
21.02	Perform control valve operating pressure and flow tests; determine needed action.	P-2
21.03	Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic).	P-2
21.04	Identify causes of control valve leakage problems (internal/external); determine needed action.	P-2
21.05	Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed.	P-1
22.0	Diagnose and repair hydraulic 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.	
22.01	Identify actuator type (single/double acting, multi-stage/telescopic, and motors).	P-1
22.02	Identify the cause of seal failure; determine needed repairs.	P-2
22.03	Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs.	P-2
22.04	Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action.	P-2
22.05	Remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures.	P-2

CTE Standards and Benchmarks	Priority Number
22.06 Inspect actuators for dents, cracks, damage, and leakage; determine needed action.	P-2
22.07 Purge and/or bleed system in accordance with manufacturers' recommended procedures.	P-1

Additional Information

Laboratory Activities

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

Special Notes

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 intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 OJT framework apply.

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

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

PSAV – Career Preparatory	
Program Number	T660100
CIP Number	0647061307
Grade Level	30, 31
Standard Length	620 hours
Teacher Certification	DIESEL MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031 – Bus and Truck Mechanics and Diesel Engine Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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 occupational completion points (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.

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

Program Structure

This program is a planned sequence of instruction consisting of 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.

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 hours	49-3031
B	DIM0811	Transit Basic Electrical Systems Technician	120 hours	49-3031
C	DIM0812	Transit Wheelchair Lift/Ramp Technician	60 hours	49-3031
D	DIM0813	Transit Diesel Engine Preventive Maintenance Technician	120 hours	49-3031
E	DIM0814	Transit Steering and Suspension Technician	120 hours	49-3031

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Identify shop organization, management, and safety requirements.
02.0 Demonstrate infection control procedures and 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 and apply proper oxy-acetylene gas practices and techniques.
06.0 Demonstrate workplace communication skills.
07.0 Demonstrate shop and occupational safety procedures.
08.0 Perform transit bus and forklift preventive maintenance.
09.0 Perform tire service, identification and repair.
10.0 Demonstrate the qualifications for employment.
11.0 Demonstrate shop and occupational safety procedures.
12.0 Maintain and repair transit bus basic electrical systems and components.
13.0 Demonstrate the qualifications for employment.
14.0 Demonstrate shop and occupational safety procedures.
15.0 Maintain and repair transit bus wheelchair lift and ramp systems and components.
16.0 Demonstrate the qualifications for employment.
17.0 Demonstrate shop and occupational safety procedures.
18.0 Perform engine preventive maintenance.
19.0 Demonstrate the qualifications for employment.
20.0 Demonstrate shop and occupational safety procedures.
21.0 Maintain and repair transit bus steering and suspension systems.
22.0 Demonstrate the qualifications for employment.

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

Course Description:
The Transit Equipment Preventive Maintenance Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study shop safety, infection control, MSDS, AED, and CPR procedures, basic tools and equipment, welding, communication, occupational safety, bus and forklift preventative maintenance, tire service, and employability.

CTE Standards and Benchmarks	
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 (MSDS) booklet is located and how it is used.
03.02	Understand, set-up, and use the Automated External Defibrillator (AED).
03.03	Learn the capabilities and limitations of cardiopulmonary resuscitation (CPR).
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

CTE Standards and Benchmarks	
	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 and apply proper oxy-acetylene gas practices, and techniques - - The student will be able to:
05.01	Perform safety inspections of equipment and accessories.
05.02	Perform external inspections of equipment and accessories.
05.03	Set up equipment safely and prepare for operations.
05.04	Examine and prepare working surfaces.
05.05	Adjust gas pressure properly.
05.06	Identify a neutral flame.
05.07	Apply proper flux.
05.08	Apply proper heat.
05.09	Perform proper shutdown procedures.
05.10	Properly store equipment and accessories according to OSHA regulations.
05.11	Inspect, clean, and secure work area.
06.0	Demonstrate workplace communication skills--The student will be able to:
06.01	Locate information in technical literature, such as a manufacturer's manual, in both print and computer versions.
06.02	Read, interpret, and apply information from parts and service manuals.
06.03	Read and follow written and oral instructions.
06.04	Read and interpret graphs, charts, diagrams, and tables commonly used in the diesel technology industry.
06.05	Answer and ask questions coherently and concisely.
06.06	Use basic keyboarding and computer skills.
06.07	Use industry-related computer software.
06.08	Interpret technical specification information and diagnose problems, both verbally and in writing.
06.09	Solve basic transit technology problems by combining knowledge of transit systems with technical information and diagnostic data.

CTE Standards and Benchmarks	
06.10	Complete accurately the required information for journals, repair orders, invoices, time cards, job sheets, and forms.
06.11	Demonstrate telephone and interpersonal communication skills to accurately and courteously exchange information with customers, co-worker, and supervisors.
07.0	Demonstrate shop and occupational safety procedures--The student will be able to:
07.01	Comply with safety regulations for all preventive maintenance technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
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	Perform transit bus and forklift preventive maintenance--The student will be able to:
08.01	Identify the types of preventive maintenance, including oil analysis, required for components and systems, according to manufacturer and company specifications.
08.02	Schedule preventive-maintenance inspections at the miles and/or times required by manufacturer and company specifications.
08.03	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.
08.04	Test-drive equipment, where liability and safety allow such tests, and identify needed repairs.
09.0	Perform tire service, identification, and repair--The student will be able to:
09.01	Identify the types of tires, wheels, tread depth measurement, and sidewall inspection criteria.
09.02	Understand relationship between tire size and speedometer, odometer, hubometer.
09.03	Identify different wear indicator patterns and relationship to defective components.
10.0	Demonstrate the qualifications for employment--The student will be able to:
10.01	Demonstrate shop organization, management, and safety requirements for a preventive maintenance technician.
10.02	Demonstrate the use of tools and equipment required for a preventive maintenance technician.
10.03	Demonstrate workplace communication skills required by a preventive maintenance technician.
10.04	Demonstrate the application of math and science principles required for a preventive maintenance technician’s job tasks.
10.05	Identify and demonstrate work habits of successful employees concerning:

CTE Standards and Benchmarks		
	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
10.06	Obtain information about training and licensing requirements, equipment needs, responsibilities, pay, benefits, work conditions, risks, and opportunities for advancement.	
10.07	Demonstrate knowledge of the “Right-to-Know” law, as recorded in (29 CFR 1910.1200)	
10.08	Demonstrate employability skills as a transit bus preventive maintenance technician.	

Florida Department of Education
Student Performance Standards

Course Number: DIM0811
Occupational Completion Point: B
Transit Basic Electrical Systems Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Basic Electrical Systems Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, basic electrical systems, and employability.

CTE Standards and Benchmarks	
11.0	Demonstrate shop and occupational safety procedures--The student will be able to:
11.01	Comply with safety regulations for all basic electrical technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
11.02	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.
12.0	Maintain and repair transit bus basic electrical systems and components--The student will be able to:
12.01	Explain the theory and nature of electricity.
12.02	Understand basic electrical terminology and symbols.
12.03	Analyze electrical circuits.
12.04	Work problems using Ohm's and Kirchoff's laws.
12.05	Understand circuit characteristics: series, parallel, open, short, and grounded.
12.06	Explain the principals of relays and transistors.
12.07	Understand mystery harness application.
12.08	Explain magnetism and electromagnetic induction.
12.09	Explain applications of alternating current (AC).
12.10	Explain principles of direct current (DC) motors and generators.
12.11	Explain principles of AC motors.
12.12	Locate and match electrical units by their symbols on a wiring diagram.
12.13	Set up and use voltmeters, ammeters, and ohmmeters.
13.0	Demonstrate the qualifications for employment--The student will be able to:

CTE Standards and Benchmarks	
13.01	Demonstrate shop organization, management, and safety requirements for a basic electrical systems technician.
13.02	Demonstrate the use of tools and equipment required for a basic electrical systems technician.
13.03	Demonstrate workplace communication skills required by a basic electrical systems technician.
13.04	Demonstrate the application of math and science principles required for a basic electrical systems technician’s job tasks.
13.05	Demonstrate employability skills as a transit bus basic electrical systems technician.

Florida Department of Education
Student Performance Standards

Course Number: DIM0812
Occupational Completion Point: C
Transit Wheelchair Lift/Ramp Technician – 60 Hours – SOC Code 49-3031

Course Description:
The Transit Wheelchair Lift/Ramp Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, wheelchair lift and ramp systems, employability.

CTE Standards and Benchmarks	
14.0	Demonstrate shop and occupational safety procedures--The student will be able to:
14.01	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.
14.02	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.
15.0	Maintain and repair transit bus wheelchair lift/ramp systems and components--The student will be able to:
15.01	Troubleshoot and repair the following:
15.02	Wheelchair lift, pumps, hoses, and components
15.03	Wheelchair ramp and associated hardware
15.04	Troubleshoot and repair kneeler faults and components.
15.05	Troubleshoot and repair lift hydraulic/electrical system.
16.0	Demonstrate the qualifications for employment--The student will be able to:
16.01	Demonstrate shop organization, management, and safety requirements for a wheelchair lift/ramp systems technician.
16.02	Demonstrate the use of tools and equipment required for a wheelchair lift/ramp systems technician.
16.03	Demonstrate workplace communication skills required by a wheelchair lift/ramp systems technician.
16.04	Demonstrate the application of math and science principles required for a wheelchair lift/ramp systems technician’s job tasks.
16.05	Demonstrate employability skills as a transit bus wheelchair lift/ramp systems technician.

Florida Department of Education
Student Performance Standards

Course Number: DIM0813
Occupational Completion Point: D
Transit Diesel Engine Preventive Maintenance Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Diesel Engine Preventive Maintenance Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, diesel engine preventive maintenance skills, employability.

CTE Standards and Benchmarks	
17.0	Demonstrate shop and occupational safety procedures--The student will be able to:
17.01	Comply with safety regulations for all diesel engine technician activities and job tasks, in accordance with local, state, and federal safety and environmental regulations.
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	Perform diesel engine preventive maintenance--The student will be able to:
18.01	Identify types of bearings and their uses.
18.02	Identify seals, gaskets, and fasteners.
18.03	Identify drive power train components and functions.
18.04	Identify threaded fasteners by size, type, thread series, thread classes, material hardness, and compatibility.
18.05	Identify the types of preventive maintenance, including oil analysis, required for components and systems, according to manufacturer and company specifications.
18.06	Schedule preventive-maintenance inspections at the miles and/or times required by manufacturer and company specifications.
18.07	Perform preventive-maintenance inspections and record results according to manufacturer and company specifications.
18.08	Demonstrate the ability to remove correctly an oil sample for analysis.
19.0	Demonstrate the qualifications for employment--The student will be able to:
19.01	Demonstrate shop organization, management, and safety.
19.02	Demonstrate the use of tools and equipment required for a diesel engine technician.
19.03	Demonstrate workplace communication skills required by a diesel engine technician.
19.04	Demonstrate the application of math and science principles required for a diesel engine technician’s job tasks.

CTE Standards and Benchmarks
19.05 Demonstrate employability skills as a transit diesel engine technician.

Florida Department of Education
Student Performance Standards

Course Number: DIM0814
Occupational Completion Point: E
Transit Steering and Suspension Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Steering and Suspension Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, steering and suspension systems, employability.

CTE Standards and Benchmarks	
20.0	Demonstrate shop and occupational safety procedures--The student will be able to:
20.01	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.
20.02	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.
21.0	Maintain and repair steering and suspension systems--The student will be able to:
21.01	Troubleshoot and repair the following:
a)	Conventional steering systems
b)	Hydraulic steering systems
c)	Rear-axle suspensions
d)	Front-axle suspensions
e)	Air ride suspension system
21.02	Service wheels, bearings, hubs, and seals.
21.03	Service tires.
21.04	Align bus frame.
21.05	Align bus height.
22.0	Demonstrate the qualifications for employment--The student will be able to:
22.01	Demonstrate shop organization, management, and safety requirements for a steering and suspension technician.
22.02	Demonstrate the use of tools and equipment required for a steering and suspension technician.
22.03	Demonstrate workplace communication skills required by a steering and suspension maintenance technician.
22.04	Demonstrate the application of math and science principles required for a steering and suspension technician's job tasks.

CTE Standards and Benchmarks
22.05 Demonstrate employability skills as a transit bus steering and suspension maintenance technician.

Additional Information

Laboratory Activities

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

Special Notes

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).

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Transit Technician 2**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T660200
CIP Number	0647061308
Grade Level	30, 31
Standard Length	620 hours
Teacher Certification	DIESEL MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031 – Bus and Truck Mechanics and Diesel Engine Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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.

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

Program Structure

This program is a planned sequence of instruction consisting of 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.

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 hours	49-3031
B	DIM0821	Transit Diesel Electrical and Diesel Engine Electronics Technician	120 hours	49-3031
C	DIM0822	Transit Drivetrain Technician	120 hours	49-3031
D	DIM0823	Transit Intermediate Electrical Systems Technician	120 hours	49-3031
E	DIM0824	Transit Brakes/Air System Technician	200 hours	49-3031

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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.

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

Course Description:
The Transit Hydraulics Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, hydraulic systems, and employability.

CTE Standards and Benchmarks	
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	Identify and explain the operating components of 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.

CTE Standards and Benchmarks	
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.

Florida Department of Education
Student Performance Standards

Course Number: DIM0821
Occupational Completion Point: B
Transit Diesel Electrical and Diesel Engine Electronics Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Diesel Electrical and Diesel Engine Electronics Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, electrical and electronic principles, and employability.

CTE Standards and Benchmarks	
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 basic concept of electricity.
05.02	Analyze electrical circuits.
05.03	Determine problems using Ohm's and Kirchoff's laws.
05.04	Understand and explain magnetism and electromagnetic induction.
05.05	Understand and explain applications of alternating current (AC).
05.06	Understand and explain principles of direct current (DC) motors and generators.
05.07	Understand and 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	Understand and explain the principles of diodes and rectifiers.
06.02	Understand and explain the principles of voltage regulation and power supply circuits.
06.03	Understand and explain the principles of transistors.

CTE Standards and Benchmarks	
	06.04 Understand and 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 Perform load test on batteries.
	07.06 Identify, diagnose, remove and replace electronic sensors.
	07.07 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.

Florida Department of Education
Student Performance Standards

Course Number: DIM0822
Occupational Completion Point: C
Transit Drivetrain Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Drivetrain Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, powertrain systems and components, and employability.

CTE Standards and Benchmarks	
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	Service and Repair automatic transmissions.
10.03	Troubleshoot power trains.
10.04	Troubleshoot transmission shift patterns
10.05	Service and repair differentials.
10.06	Identify and service drivelines.
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.

Florida Department of Education
Student Performance Standards

Course Number: DIM0823
Occupational Completion Point: D
Transit Intermediate Electrical Systems Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Intermediate Electrical Systems Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, intermediate electrical systems, and employability.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks
14.05 Demonstrate employability skills as a transit bus intermediate electrical systems technician.

Florida Department of Education
Student Performance Standards

Course Number: DIM0824
Occupational Completion Point: E
Transit Brakes/Air System Technician – 200 Hours – SOC Code 49-3031

Course Description:
The Transit Brakes/Air System Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, transit bus brake and air systems, and employability.

CTE Standards and Benchmarks	
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.

CTE Standards and Benchmarks	
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.

Additional Information

Laboratory Activities

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

Special Notes

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).

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Program Title: **Transit Technician 3**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Career Preparatory	
Program Number	T660300
CIP Number	0647061309
Grade Level	30, 31
Standard Length	680 hours
Teacher Certification	DIESEL MECH @7 7G
CTSO	SkillsUSA
SOC Codes (all applicable)	49-3031 – Bus and Truck Mechanics and Diesel Engine Specialists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

Purpose

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

The content includes but is not limited to 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.

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.

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

Program Structure

This program is a planned sequence of instruction consisting of 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.

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 hours	49-3031
B	DIM0831	Transit Advanced Electrical Systems Technician	120 hours	49-3031
C	DIM0832	Transit Heating And Air-Conditioning Technician	200 hours	49-3031
D	DIM0833	Transmission Diagnosis, Rebuild And Repair Technician	120 hours	49-3031
E	DIM0834	Diesel Engine Diagnosis, Rebuild And Repair Technician	120 hours	49-3031

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 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.

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

Course Description:
The Transit Alternative Fuels System Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, alternative fuel systems and components, and employability.

CTE Standards and Benchmarks	
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 transit bus alternative fuels systems and components--The student will be able to:
02.01	Troubleshoot, analyze, and diagnose the following:
	a) ESS Energy Storage System
	b) DPIM Dual Power Inverter Module
	c) TCM/VCM
02.02	Identify and comprehend torque blending.
02.03	Identify and comprehend Fuel Cells, ULSD, PC-10 and CJ-4 Oils.
02.04	Identify and comprehend the characteristics and limitations of Bio-diesel, CNG, E85 Ethanol, and EP40 hybrid-electric.
02.05	Demonstrate the unique characteristics of CNG as an Alternative Fuel.
02.06	Demonstrate a working knowledge of CNG fuel systems and components.
02.07	Demonstrate proper diagnostic procedures for the CNG fuel system.
02.08	Understand the principles of “Cooled EGR” system.
02.09	Understand the principles of the 3-way exhaust catalyst system.

CTE Standards and Benchmarks	
02.10	Demonstrate CNG gas safety, Maintenance, Base Engine, Combustion Air System, Fuel system & Fuel Control system, Electronic Control System.
02.11	Identify various CNG cylinders types and installations, Inspect CNG cylinders for damage and disposition of damaged cylinders
02.12	Define Mass Air Flow Management Systems and identify the following sensors; Temperature Sensors, Pressure Sensors, Position Sensors, Voltage Producing Sensors, Mass Gas and Air Flow Sensors.
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.

Florida Department of Education
Student Performance Standards

Course Number: DIM0831
Occupational Completion Point: B
Transit Advanced Electrical Systems Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transit Advanced Electrical Systems Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, advanced electrical systems, and employability.

CTE Standards and Benchmarks	
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.

Florida Department of Education
Student Performance Standards

Course Number: DIM0832
Occupational Completion Point: C
Transit Heating and Air-Conditioning Technician – 200 Hours – SOC Code 49-3031

Course Description:
The Transit Heating and Air-Conditioning Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, heating and air-conditioning systems, and employability.

CTE Standards and Benchmarks	
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 transit bus heating and air-conditioning systems--The student will be able to:
08.01	Identify basic heating and air-conditioning components.
08.02	Recognize and 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	Perform Leak-test on a basic AC system.
08.08	Evaluate and charge a basic AC system using recovery equipment.
08.09	Assess, repair and/or service AC electrical circuits.
08.10	Assess, repair and/or 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.

CTE Standards and Benchmarks	
	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.

Florida Department of Education
Student Performance Standards

Course Number: DIM0833
Occupational Completion Point: D
Transmission Diagnosis, Rebuild and Repair Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Transmission Diagnosis, Rebuild and Repair Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, transit bus transmission assemblies, and employability.

CTE Standards and Benchmarks	
10.0	Demonstrate shop and occupational safety procedures--The student will be able to:
10.01	Comprehend and 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.

CTE Standards and Benchmarks
12.05 Demonstrate employability skills as a transit bus transmission diagnosis, rebuild and repair technician.

Florida Department of Education
Student Performance Standards

Course Number: DIM0834
Occupational Completion Point: E
Diesel Engine Diagnosis, Rebuild and Repair Technician – 120 Hours – SOC Code 49-3031

Course Description:
The Diesel Engine Diagnosis, Rebuild and Repair Technician course prepares students for entry into the transit bus service industry. Content emphasizes beginning skills and concepts as a recommended requisite. Students study occupational safety, engine operations, math science, troubleshooting skills, cylinder-heads, camshaft assemblies, engine block assemblies, and employability.

CTE Standards and Benchmarks	
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.
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.

CTE Standards and Benchmarks	
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)	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.

CTE Standards and Benchmarks	
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.

Additional Information

Laboratory Activities

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

Special Notes

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).

Career and Technical Student Organization (CTSO)

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

Basic Skills

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.

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; 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.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

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

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

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Florida Department of Education
Curriculum Framework

Course Title: **Transportation, Distribution and Logistics Cooperative Education-OJT**
Course Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

PSAV – Cooperative Education - OJT	
Course Number	T809999
CIP Number	06499999CP
Grade Level	30, 31
Standard Length	Multiple hours
Teacher Certification	Any District Certification appropriate to the students' chosen career field
CTSO	SkillsUSA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

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 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 cluster.

Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

Transportation, Distribution and Logistics Cooperative Education OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education - OJT Training Plan.

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

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Perform designated job skills.
02.0 Demonstrate work ethics.

Florida Department of Education
Student Performance Standards

Program Title: **Transportation, Distribution and Logistics Cooperative Education OJT**
PSAV Number: **T809999**

Standards and Benchmarks	
01.0	Perform designated job skills--The student will be able to:
01.01	Perform tasks as outlined in the training plan.
01.02	Demonstrate job performance skills.
01.03	Demonstrate safety procedures on the job.
01.04	Maintain appropriate records.
01.05	Attain an acceptable level of productivity.
01.06	Demonstrate appropriate dress and grooming habits.
02.0	Demonstrate work ethics--The student will be able to:
02.01	Follow directions.
02.02	Demonstrate good human relations skills on the job.
02.03	Demonstrate good work habits.
02.04	Demonstrate acceptable business ethics.

Additional Information

Special Notes

The **Cooperative Education Manual** is available on-line and has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE Website at http://www.fldoe.org/core/fileparse.php/3/urlt/steps-manual.pdf.

Career and Technical Student Organization (CTSO)

SkillsUSA is the intercurricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. 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 to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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

Additional Resources

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http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml