Florida Department of Education
Curriculum Framework

Program Title: **Automotive Maintenance and Light Repair Technician**
Program Type: **Career Preparatory**
Career Cluster: **Transportation, Distribution and Logistics**

Career Certificate Program		
Program Number	T404100	
CIP Number	0647060422	
Grade Level	30, 31	
Program Length	600 hours	
Teacher Certification	Refer to the **Program Structure** section	
CTSO	SkillsUSA	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 10	Communications (Reading and Language Arts): 9

Purpose

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

The content includes but is not limited to 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 one occupational completion point. It is **strongly recommended** that the scope, sequence, and course recommendations be followed.

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

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

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
	AER0025	Maintenance and Light Repair Technician 1		150 hours
	AER0026	Maintenance and Light Repair Technician 2	AUTO IND @7 %7 %G	150 hours
	AER0027	Maintenance and Light Repair Technician 3	AUTO MECH @7 7G	150 hours
A	AER0028	Maintenance and Light Repair Technician 4		150 hours

National Standards

Programs identified as having Industry or National Standards to the corresponding standards and/or benchmarks for the Automotive Maintenance and Light Repair Technician program can be found using the following link: https://www.aseeducationfoundation.org/program-accreditation

Common Career Technical Core – Career Ready Practices

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

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

2. Apply appropriate academic and technical skills.

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

4. Communicate clearly, effectively and with reason.

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

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

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

9. Model integrity, ethical leadership and effective management.

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

11. Use technology to enhance productivity.

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

Standards

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

01.0 Proficiently explain and apply required shop and personal safety tasks 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, lubrication, and cooling systems.
05.0 Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, instrument cluster, driver information, and body electrical systems.
06.0 Explain and apply proficiently the diagnosis, service and repair of front and rear suspension systems, wheel alignment, and wheels and tires.
07.0 Explain and apply proficiently the diagnosis, service, and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, and related (wheel bearings, parking brake, electrical, etc.) systems.
08.0 Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, heating, ventilation, and engine cooling, operating and related control systems.
09.0 Explain and apply proficiently the diagnosis, service and repair of engine computerized controls, fuel, air induction, exhaust, and emission control systems.
10.0 Explain and apply proficiently the diagnosis, service, repair and overhaul of in-vehicle and off-vehicle automatic transmissions/transaxles.
11.0 Explain and apply proficiently the diagnosis, service and repair of manual drivetrain, clutches, transmissions/transaxles, drive and half-shafts, universal and constant velocity joints, differential case assemblies, drive axles, four-wheel and all-wheel drive systems.

Florida Department of Education
Student Performance Standards

Program Title: **Automotive Maintenance and Light Repair Technician**
Career Certificate Program Number: **T404100**

It is strongly recommended that the following scope, sequence, and course recommendations be followed.

Course Description: The Maintenance and Light Repair Technician 1 course prepare students for entry into Maintenance and Light Repair Technician 2. Students explore career opportunities and requirements of a professional service technician. Content emphasizes beginning transportation service skills and workplace success skills. Students study safety, tools, equipment, shop operations, basic engine fundamentals, and basic technician skills.

Abbreviations:
ASE = Required Supplemental Tasks
ER = Engine Repair

For every task in Maintenance and Light Repair 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.

ER Task List:	
P-1 =	12
P-2 =	2
P-3 =	1
Total	15

Course Number: AER0025 Occupational Completion Point: A (1 of 4) Maintenance and Light Repair Technician 1 – 150 Hours		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 appropriate automotive industry certifications.	
01.03	Identify and define career opportunities in the automotive service industry.	
01.04	Research, identify, and interpret the Federal Law as recorded in (29 CFR-1910.1200).	
01.05	Identify appropriate emergency first aid procedures.	
01.06	Utilize and demonstrate safe procedures for handling of tools and equipment.	ASE
01.07	Identify and use proper placement of floor jacks and jack stands.	ASE

	01.08 Identify and use proper procedures for safe lift operation.	ASE
	01.09 Utilize proper ventilation procedures for working within the lab/shop area.	ASE
	01.10 Identify proper procedures for safe pit usage.	
	01.11 Identify marked safety areas.	ASE
	01.12 Identify the location and the types of fire extinguishers and other fire safety equipment.	ASE
	01.13 Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment.	ASE
	01.14 Identify the location and use of eye wash stations.	ASE
	01.15 Identify the location of the posted evacuation routes.	ASE
	01.16 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	ASE
	01.17 Identify and wear appropriate clothing for lab/shop activities.	ASE
	01.18 Secure hair and jewelry for lab/shop activities.	ASE
	01.19 Use proper handling procedures for automotive fluids.	
	01.20 Identify and describe typical automotive lubricants and lubricant properties.	
	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 Safety Data Sheets (SDS).	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
03.04	Demonstrate use of the three C's (Concern, Cause, and Correction).	ASE
03.05	Review vehicle service history.	ASE
03.06	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	ASE
03.07	Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.	
03.08	Determine the presence of a Tire Pressure Monitoring System (TPMS).	
03.09	Determine the presence of wheel locks.	
03.10	Determine the presence of an air suspension system or hydraulic system.	
03.11	Check operation and status of instrument panel warning lights and gauges.	
03.12	Locate and use Vehicle identification Number (VIN) vehicle information placards, decals, tags, as required.	
03.13	Demonstrate proficiency in manufacturer electronic service information system, including flat rate manuals, technical service bulletins and replacement part identification; where applicable.	
03.14	Use proper chemicals for cleaning and lubrication.	
03.15	Reset maintenance indicators as applicable.	
03.16	Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).	ASE
03.17	Inspect under-hood area for leaks, damage, and unusual conditions.	
03.18	Determine fluid type requirements and identify fluid.	
03.19	Check engine oil level and condition; service as required.	
03.20	Check engine coolant level and condition; service as required.	
03.21	Check power steering fluid level and condition; service as required.	
03.22	Check brake fluid level and condition; service as required.	
03.23	Check hydraulic clutch fluid and condition; service as required.	
03.24	Check windshield washer fluid level and condition; service as required.	
03.25	Check automatic transmission fluid level and condition; service as required.	
03.26	Inspect undercar area for leaks, damage, and unusual conditions.	

03.27	Check differential/transfer case fluid level; note unusual conditions; service as required.	
03.28	Check manual transmission fluid level; note unusual conditions; service as required.	
03.29	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear.	
03.30	Lubricate driveline, suspension and steering systems as applicable.	
03.31	Inspect cooling system pipes and hoses for wear, damage, and proper routing.	
03.32	Inspect and replace inline fuel filters as applicable.	
03.33	Inspect and replace air filter.	
03.34	Inspect and replace cabin air filter.	
03.35	Inspect, replace and adjust drive belts; inspect tensioners and pulleys.	
03.36	Document observed damage, unusual conditions, and concerns.	
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 shock absorbers and related components.	
03.41	Inspect constant velocity (CV) axle shaft boots; service as required.	
03.42	Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).	
03.43	Identify nitrogen-filled tires.	
03.44	Inspect tires, diagnose tire wear patterns, inspect spare and mounting system; check and adjust tire pressure; where applicable.	
03.45	Rotate tires according to manufacturer’s recommendations.	
03.46	Balance wheel and tire assembly (static, dynamic and road force balance); where applicable.	
03.47	Dismount, inspect, and remount tire on wheel.	
03.48	Repair tire according to industry standards.	
03.49	Reinstall wheel; torque wheel fasteners to specification.	
03.50	Check wheel bearings for play and other signs of wear.	
03.51	Perform a visual inspection of a brake drum system.	
03.52	Perform a visual inspection of a disc brake system.	
03.53	Check parking brake operation; check parking brake components for unusual conditions.	

03.54	Check wiper blades, inserts, and arms; replace wiper blades or inserts.	
03.55	Lubricate door latches and hinges.	
03.56	Inspect fuel tank, fuel cap and seal; inspect and replace fuel lines, fittings, and hoses; as applicable.	
03.57	Identify the type of battery and perform slow or fast battery charge.	
03.58	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.	
03.59	Perform battery, starting, and charging system tests using appropriate tester.	
03.60	Start a vehicle using jumper cables or a battery auxiliary power supply (jump box).	
03.61	Maintain or restore electronic memory functions if required.	
03.62	Inspect and replace exterior and courtesy lamps.	
04.0	Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, lubrication and cooling systems. The student will be able to:	
General		
04.01	Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
04.02	Verify operation of the instrument panel engine warning indicators.	P-1
04.03	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	P-1
04.04	Install engine covers using gaskets, seals and sealers as required.	P-1
04.05	Verify engine mechanical timing.	P-2
04.06	Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.	
04.07	Identify service precautions related to service of the internal combustion engine of a hybrid vehicle.	P-2
04.08	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
Cylinder Head and Valve Train		
04.09	Adjust valves (mechanical or hydraulic lifters).	P-3
04.10	Identify components of the cylinder head and valve train.	P-1
Lubrication and Cooling Systems		
04.11	Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action.	P-1
04.12	Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.	P-1

04.13	Remove, inspect, and replace thermostat and gasket/seal.	P-1
04.14	Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required.	P-1
04.15	Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as require.	P-1
04.16	Identify components of the lubrication and cooling systems.	P-1

It is strongly recommended that the following scope, sequence, and course recommendations be followed.

Course Description: The Maintenance and Light Repair Technician 2 course prepare students for entry into Maintenance and Light Repair Technician 3. Students study automotive general electrical systems, starting and charging systems, batteries, lighting, and electrical accessories. Content emphasizes beginning transportation service skills and workplace success skills.

Abbreviations:
EE = Electrical/Electronic Systems

For every task in Maintenance and Light Repair 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.

EE Task List:	
P-1	**= 26**
P-2	**= 10**
P-3	**= 2**
Total	**38**

Course Number: AER0026 Occupational Completion Point: A (2 of 4) Maintenance and Light Repair Technician 2 – 150 Hours		**Priority Number**
05.0	Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, security, infotainment, and accessory systems. The student will be able to:	
General		
05.01	Research vehicle service information including vehicle service history, service precautions, and technical service bulletins.	P-1
05.02	Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	
05.03	Use wiring diagrams to trace electrical/electronic circuits.	P-1
05.04	Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.	P-1

05.05 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-1
05.06 Use a test light to check operation of electrical circuits.	P-2
05.07 Use fused jumper wires to check operation of electrical circuits.	P-2
05.08 Measure key-off battery drain (parasitic draw).	P-2
05.09 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	P-1
05.10 Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair)	P-1
05.11 Identify electrical/electronic system components and configuration.	P-1
05.12 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	P-1
Battery Service	
05.13 Perform battery state-of-charge test; determine necessary action.	P-1
05.14 Confirm size, type and proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action.	P-1
05.15 Maintain or restore electronic memory functions.	P-1
05.16 Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.	P-1
05.17 Perform slow/fast battery charge according to manufacturer’s recommendations.	P-1
05.18 Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.	P-1
05.19 Identify safety precautions for high voltage systems on electric, hybrid-electric, and diesel vehicles.	P-2
05.20 Identify electrical/electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery.	P-1
05.21 Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	P-2
Starting System	
05.22 Perform starter current draw tests; determine necessary action.	P-1
05.23 Perform starter circuit voltage drop tests; determine necessary action.	P-1
05.24 Inspect and test starter relays and solenoids; determine necessary action.	P-2
05.25 Remove and install starter in a vehicle.	P-1
05.26 Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.	P-2
05.27 Demonstrate knowledge of an automatic idle-stop/start-stop system.	P-3

Charging System	
05.28 Confirm proper manufacture battery capacity for vehicle application; perform charging system output test; determine necessary action.	P-1
05.29 Inspect, adjust, and/or replace generator (alternator) drive belts, check pulleys, and tensioners for wear; check pulley and belt alignment.	P-1
05.30 Remove, inspect, and/or replace generator (alternator).	P-2
05.31 Perform charging circuit voltage drop test; determine necessary action.	P-2
Lighting, Instrument Cluster, Driver Information, Security, Infotainment, and Body Electrical Systems	
05.32 Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.	P-1
05.33 Aim headlights.	P-2
05.34 Identify system voltage and safety precautions associated with high-intensity discharge headlights.	P-2
05.35 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.	P-1
05.36 Remove and reinstall door panel.	P-1
05.37 Describe the operation of keyless entry/remote-start systems.	P-3
05.38 Verify operation of instrument panel gauges and warning /indicator lights; reset maintenance indicators.	P-1
05.39 Verify windshield wiper and washer operation, replace wiper blades.	P-1
05.40 Describe the operation of Infotainment systems i.e., audio video and recording operations.	
05.41 Describe the various security systems both on-car and remote operational type systems.	

It is strongly recommended that the following scope, sequence, and course recommendations be followed.

Course Description: The Maintenance and Light Repair Technician 3 course prepare students for entry into Maintenance and Light Repair Technician 4. Students study and service suspension and steering systems, and brake systems. Content emphasizes beginning transportation service skills and workplace success skills.

Abbreviations:
SS = Suspension and Steering
BR = Brakes

For every task in Maintenance and Light Repair 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

SS Task List:	
P-1 =	**29**
P-2 =	**6**
P-3 =	**1**
Total	**36**

BR Task List:	
P-1 =	**29**
P-2 =	**5**
P-3 =	**3**
Total	**37**

disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Course Number: AER0027 Occupational Completion Point: A (3 of 4) Maintenance and Light Repair Technician 3 – 150 Hours	**Priority Number**
06.0 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:	
General	
06.01 Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
06.02 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.	P-1
06.03 Identify suspension and steering system components and configurations.	P-1
06.04 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
Related Suspension and Steering Service	
06.05 Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.	P-1
06.06 Inspect power steering fluid level and condition.	P-1
06.07 Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification.	P-2
06.08 Inspect for power steering fluid leakage.	P-1
06.09 Remove, inspect, replace, and/or adjust power steering pump drive belt.	P-1
06.10 Inspect and replace power steering hoses and fittings.	P-2
06.11 Inspect pitman arm, relay (center-link/intermediate) rod, idler arm, mountings, and steering linkage damper.	P-1
06.12 Inspect tie rod ends (sockets), tie rod sleeves, and clamps.	P-1
06.13 Inspect upper and lower control arms, bushings, and shafts.	P-1
06.14 Inspect and replace rebound bumpers.	P-1
06.15 Inspect track bar, strut rods/radius arms and related mounts and bushings.	P-1
06.16 Inspect upper and lower ball joints (with or without wear indicators).	P-1
06.17 Inspect suspension system coil springs and spring insulators (silencers).	P-1
06.18 Inspect suspension system torsion bars and mounts.	P-1
06.19 Inspect and/or replace front stabilizer bar (sway bar) bushings, brackets, and links.	P-1
06.20 Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings.	P-2

06.21	Inspect front strut bearing and mount.	P-1
06.22	Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.	P-1
06.23	Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts and mounts.	P-1
06.24	Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.	P-1
06.25	Inspect electric power steering assist system.	P-2
06.26	Identify hybrid vehicle power steering system electrical circuits and safety precautions.	P-2
06.27	Describe the function of suspension and steering control systems and components, (i.e., active suspension, and stability control).	P-3
06.28	Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.	
Wheel Alignment		
06.29	Perform pre-alignment inspection; measure vehicle ride height.	P-1
06.30	Describe alignment angles (camber, caster and toe)	P-1
06.31	Identify alignment related symptoms such as wander, drift and pull.	
06.32	Measure front and rear wheel camber; adjust as needed.	
06.33	Measure caster; adjust as needed.	
06.34	Measure front wheel toe; adjust as needed.	
06.35	Center the steering wheel using mechanical methods.	
06.36	Measure rear wheel toe, adjust as needed.	
06.37	Measure thrust angle.	
06.38	Calibrate steering angle sensor.	
Wheels and Tires		
06.39	Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label.	P-1
06.40	Rotate tires according to manufacturer’s recommendations including vehicles equipped with tire pressure monitoring systems (TPMS).	P-1
06.41	Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly.	P-1
06.42	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	P-1
06.43	Inspect tire and wheel assembly for air loss; determine necessary action.	P-1

06.44	Repair tire following vehicle manufacturer approved procedure.	P-1
06.45	Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps.	P-1
06.46	Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure.	P-1
07.0	Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems. The student will be able to:	
General		
07.01	Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
07.02	Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).	P-1
07.03	Install wheel and torque lug nuts.	P-1
07.04	Identify brake system components and configuration.	P-1
07.05	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
Hydraulic System		
07.06	Describe proper brake pedal height, travel, and feel.	P-1
07.07	Check master cylinder for external leaks and proper operation.	P-1
07.08	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports.	P-1
07.09	Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification.	P-1
07.10	Identify components of hydraulic brake warning light system.	P-3
07.11	Bleed and/or flush brake system.	P-1
07.12	Test brake fluid for contamination.	P-1
07.13	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	
Drum Brakes		
07.14	Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.	P-1
07.15	Refinish brake drum and measure final drum diameter; compare with specification.	P-1
07.16	Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.	P-1

07.17	Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-2
07.18	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.	P-1
Disc Brakes		
07.19	Remove and clean caliper assembly; inspect for leaks and damage/wear; determine necessary action.	P-1
07.20	Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.	P-1
07.21	Remove, inspect, and/or replace brake pads and retaining hardware; determine necessary action.	P-1
07.22	Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks.	P-1
07.23	Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action.	P-1
07.24	Remove and reinstall/replace rotor.	P-1
07.25	Refinish rotor on vehicle; measure final rotor thickness and compare with specification.	P-1
07.26	Refinish rotor off vehicle; measure final rotor thickness and compare with specification.	P-1
07.27	Retract and re-adjust caliper piston on an integral parking brake system.	P-2
07.28	Check brake pad wear indicator; determine necessary action.	P-1
07.29	Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation.	P-1
Power-Assist Units		
07.30	Check brake pedal travel with, and without, engine running to verify proper power booster operation.	P-2
07.31	Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P-1
Related Systems (Wheel Bearings, Parking Brakes, Electrical, Etc.)		
07.32	Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.	P-1
07.33	Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.	P-2
07.34	Check parking brake operation, both mechanical and electronic type systems and parking brake indicator light system operation; determine necessary action.	P-1
07.35	Check operation of brake stop light system.	P-1
07.36	Replace wheel bearing and race.	P-2
07.37	Inspect and replace wheel studs.	P-1
Electronic Brakes, Traction Control, and Stability Control Systems		

07.38 Identify traction control/vehicle stability control system components.	P-3
07.39 Describe the operation of a regenerative braking system.	P-3

It is strongly recommended that the following scope, sequence, and course recommendations be followed.

Course Description: The Maintenance and Light Repair Technician 4 prepare students for entry into the automotive workforce. Student's study and service automotive HVAC systems, engine performance systems, automatic and manual transmission/transaxle systems, as well as practice workplace soft skills.

Abbreviations:
HA = Heating and Air Conditioning
EP = Engine Performance
AT = Automatic Transmission/Transaxle
MD = Manual Drive Train and Axles

For every task in Maintenance and Light Repair Technician 4, 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:	EP Task List:	AT Task List:	MD Task List:
P-1 = 6	P-1 = 8	P-1 = 6	P-1 = 9
P-2 = 2	P-2 = 7	P-2 = 3	P-2 = 5
P-3 = 0	P-3 = 0	P-3 = 2	P-3 = 1
Total 8	Total 15	Total 11	Total 15

Course Number: AER0028 Occupational Completion Point: A (4 of 4) Maintenance and Light Repair Technician 4 – 150 Hours	**Priority Number**
08.0 Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, heating, ventilation, and engine cooling, operating and related control systems. The student will be able to:	
General	
08.01 Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.	P-1
08.02 Identify heating, ventilation and air conditioning (HVAC) components and configuration.	P-1
08.03 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
Refrigeration System Components	
08.04 Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action.	P-1

08.05 Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.	P-2
08.06 Inspect A/C condenser for airflow restrictions; determine necessary action.	P-1
Heating, Ventilation, and Engine Cooling Systems	
08.07 Inspect engine cooling and heater system hoses and pipes; determine necessary action.	P-1
Operating Systems and Related Controls	
08.08 Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; determine necessary action.	P-1
08.09 Identify the source of A/C system odors.	P-2
09.0 Explain and apply proficiently the diagnosis, service and repair of engine computerized controls, fuel, air induction, exhaust, and emission control systems. The student will be able to:	
General	
09.01 Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
09.02 Perform engine absolute manifold pressure tests (vacuum/boost); document results.	P-2
09.03 Perform cylinder power balance test; document results.	P-2
09.04 Perform cylinder cranking and running compression tests; document results.	P-2
09.05 Perform cylinder leakage test; document results.	P-2
09.06 Verify engine operating temperature.	P-1
09.07 Remove and replace spark plugs; inspect secondary ignition components for wear and damage.	P-1
Computerized Controls	
09.08 Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable.	P-1
09.09 Describe the use of the OBD monitors for repair verification.	P-1
Fuel, Air Induction, and Exhaust Systems	
09.10 Replace fuel filter(s) where applicable.	P-2
09.11 Inspect, service or replace air filters, filter housings, and intake duct work.	P-1
09.12 Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action.	P-1
09.13 Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action.	P-1
09.14 Check and refill diesel exhaust fluid (DEF).	P-2

Emissions Control Systems		
09.15	Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action.	P-2
10.0	Explain and apply proficiently the diagnosis, service, repair and overhaul of in-vehicle and off-vehicle automatic transmissions/transaxles. The student will be able to:	
General		
10.01	Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
10.02	Check fluid level in a transmission or a transaxle equipped with a dipstick.	P-1
10.03	Check fluid level in a transmission or a transaxle not equipped with a dipstick.	P-1
10.04	Check transmission fluid condition; check for leaks.	P-2
10.05	Identify drive train components and configuration.	P-1
10.06	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
In-Vehicle Transmission/Transaxle		
10.07	Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch.	P-2
10.08	Inspect for leakage at external seals, gaskets, and bushings.	P-1
10.09	Inspect, replace, and/or align power train mounts.	P-2
10.10	Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.	P-1
Off-Vehicle Transmission and Transaxle		
10.11	Describe the operational characteristics of a continuously variable transmission (CVT).	P-3
10.12	Describe the operational characteristics of a hybrid vehicle drive train.	P-3
11.0	Explain and apply proficiently the diagnosis, service and repair of manual drivetrain, clutches, transmissions/transaxles, drive and half-shafts, universal and constant velocity joints, differential case assemblies, drive axles, four-wheel and all-wheel drive systems. The student will be able to:	
General		
11.01	Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1
11.02	Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification.	P-1
11.03	Check fluid condition; check for leaks.	P-2

11.04 Identify manual drive train and axle components and configuration.	P-1
11.05 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
Clutch	
11.06 Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification	P-1
11.07 Check for hydraulic system leaks.	P-1
Transmission/Transaxle	
11.08 Describe the operational characteristics of an electronically controlled manual transmission/transaxle.	P-2
Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints (Front, Rear, All, and Four-wheel drive)	
11.09 Inspect, remove, and/or replace bearings, hubs, and seals.	P-2
11.10 Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints.	P-2
11.11 Inspect locking hubs.	P-3
11.12 Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.	P-2
Differential Case Assembly	
11.13 Clean and inspect differential case; check for leaks; inspect housing vent.	P-1
11.14 Check and adjust differential case fluid level; use proper fluid type per manufacturer specification.	P-1
11.15 Drain and refill differential housing.	P-1
11.16 Inspect and replace drive axle wheel studs.	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 ASE tasks.

Career and Technical Student Organization (CTSO)

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

Cooperative Training – OJT

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

Basic Skills

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

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

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan

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

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