



## Maintenance and Light Repair

Career Cluster	Transportation, Distribution & Logistics
Course Code	20104
Prerequisite(s)	None
Credit	0.5 or 1.0
Program of Study and Sequence	Any foundation course – <b>Maintenance and Light Repair (MLR)</b> – Any advanced course
Student Organization	SkillsUSA
Coordinating Work-Based Learning	N/A
Industry Certifications	N/A
Dual Credit or Dual Enrollment	See: <a href="https://sdmylife.com/images/Approved-CTE-Dual-Credit.pdf">https://sdmylife.com/images/Approved-CTE-Dual-Credit.pdf</a>
Teacher Certification	Transportation, Distribution & Logistics Cluster Endorsement; Automotive Technology Pathway Endorsement; *Automotive Technology
Resources	N/A

### Course Description

This is an entry level course where students will learn basic maintenance procedures and safe work practices. The goal of this course is for students to receive industry-based training at the basic level and advance to the higher level of competency in this field. Students who complete this course should be able to test for their ASE certification in this field.

### Program of Study Application

Maintenance and Light Repair is a cluster course in the Transportation, Distribution and Logistics career cluster. Success in Maintenance and Light Repair will prepare a student to enter any of the pathways in the cluster.

## Course Standards

<b>MLR 1: Students will demonstrate safety practices for automotive repair.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>MLR 1.1 Identify and demonstrate general shop safety rules and procedures using Occupational Safety and Health Administration (OSHA) standards.</p> <ul style="list-style-type: none"> <li>● Examine basic shop safety using OSHA 10 standards</li> <li>● Utilize proper ventilation procedures for working within the lab/shop area</li> <li>● Identify marked safety areas</li> <li>● Identify location and types of fire extinguishers and other fire safety equipment</li> <li>● Identify location and use of eyewash stations</li> <li>● Identify location of posted evacuation routes</li> <li>● Demonstrate knowledge of industry requirements for personal protective clothing and equipment</li> <li>● Identify and wear proper clothing, hairstyles and jewelry for lab/shop activities</li> <li>● Locate and demonstrate knowledge of safety data sheets (SDS)</li> </ul>

<b>MLR 2: Students will demonstrate an understanding of the safe and appropriate use of tools and equipment.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>LR 2.1 Utilize safe procedures for handling of tools and equipment.</p> <ul style="list-style-type: none"> <li>● Identify and use proper placement of floor jacks and jack stands</li> <li>● Identify and use proper procedures for safe lift operation</li> <li>● Demonstrate knowledge of safety aspects of supplemental restraint systems (SRS), electronic brake control systems and hybrid vehicle high voltage circuits</li> <li>● Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge [HID] lamps, ignition systems, injection systems, etc.)</li> </ul>

<b>MLR 3: Students will locate needed information.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
One Recall	<p>MLR 3.1 Identify sources of service information.</p> <ul style="list-style-type: none"> <li>● Locate and use paper and electronic manuals</li> <li>● Locate and use Technical Service Bulletins (TSB)</li> <li>● Demonstrate awareness of special service messages, service campaigns/recalls, vehicle/service warranty applications, and service interval recommendations</li> </ul>
One Recall	<p>MLR 3.2 Identify proper vehicle identification information.</p> <ul style="list-style-type: none"> <li>● Locate vehicle identification number (VIN) and production date code</li> <li>● Apply knowledge of VIN information</li> <li>● Demonstrate awareness of other vehicle information labels (such as tire, emissions, etc.)</li> </ul>

<b>MLR 4: Students will understand and apply appropriate business practices.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Three Strategic Thinking	MLR 4.1 Demonstrate the importance of, and the procedures for, maintaining accurate records.
Three Strategic Thinking	MLR 4.2 Understand the concept and application of ethical business practices.
Three Strategic Thinking	MLR 4.3 Understand the concept and application of excellent customer relations practices.

<b>MLR 5: Students will perform basic vehicle service.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>MLR 5.1 Perform basic vehicle service.</p> <ul style="list-style-type: none"> <li>● Determine fluid type requirements and identify fluid</li> <li>● Check and adjust engine oil</li> <li>● Check and adjust engine coolant level</li> <li>● Check and adjust power steering fluid level</li> <li>● Check and adjust brake fluid level</li> <li>● Check and adjust windshield washer fluid level</li> <li>● Check and adjust differential /transfer case fluid level</li> <li>● Check and adjust transmission fluid level</li> <li>● Check and replace wiper blades</li> <li>● Inspect drive belts, tensioners, and pulleys; check pulley and belt alignment</li> <li>● Inspect and replace air filter</li> <li>● Check and adjust tire air pressure</li> <li>● Inspect exhaust system</li> </ul>

<b>MLR 6: Students will inspect and repair engine.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>IMLR 6.1 Test and perform actions necessary to repair engine.</p> <ul style="list-style-type: none"> <li>● Demonstrate knowledge of four-cycle engine</li> <li>● Inspect engine assembly for fuel, oil coolant and other leaks; determine necessary action</li> <li>● Perform cooling system pressure tests; test coolant condition; inspect and test radiator, pressure cap, coolant recovery tank and hoses; perform necessary action</li> <li>● Test cooling system for the presence of combustion gases</li> <li>● Drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required</li> <li>● Perform oil and filter change; reset oil life monitoring system where applicable</li> <li>● Remove and replace radiator; replace radiator hoses</li> <li>● Inspect powertrain mounts; determine necessary action</li> </ul>

<b>MLR 7 Students will service an automatic transmission.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	MLR 7.1 Service transmission system. <ul style="list-style-type: none"> <li>● Drain automatic transmission fluid</li> <li>● Visually inspect the amount of debris in oil pan</li> <li>● Remove filter and install new filter</li> <li>● Install the proper fluid to the proper level</li> </ul>

<b>MLR 8: Students will inspect, diagnose and repair manual drive train and axles.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	MLR 8.1 Diagnose and repair manual drive train and axles. <ul style="list-style-type: none"> <li>● Diagnose fluid loss, level, and condition concerns; determine necessary action</li> <li>● Drain and fill transmission/transaxle and final drive unit</li> <li>● Identify and inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine necessary action</li> <li>● Identify and inspect hydraulic clutch slave and master cylinders, lines and hoses; determine necessary action</li> <li>● Bleed clutch hydraulic system</li> <li>● Inspect constant velocity (CV) joint boots</li> <li>● Remove and replace rear wheel drive shaft</li> </ul>

<b>MLR 9: Students will repair suspension and steering.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	MLR 9.1 Diagnose suspension and steering; determine necessary action. <ul style="list-style-type: none"> <li>● Determine proper power steering fluid types</li> <li>● Flush, fill and bleed power steering system</li> <li>● Diagnose power steering fluid leakage; determine necessary action</li> <li>● Lubricate suspension and steering systems</li> <li>● Inspect, remove and replace shock absorbers</li> <li>● Inspect and install stabilizer bar bushings, brackets, and links</li> <li>● Inspect and install strut cartridge or assembly, coil spring, insulators (silencers), and upper strut mount</li> <li>● Perform pre-alignment inspection and measure vehicle ride height; determine necessary action</li> <li>● Demonstrate knowledge of the principles of steering geometry using caster, camber and toe</li> </ul>
Two Skill/Concept	MLR 9.2 Inspect and repair tire and wheel assembly. <ul style="list-style-type: none"> <li>● Diagnose tire wear patterns; determine necessary action</li> <li>● Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action</li> <li>● Identify vehicles equipped with a tire pressure monitoring system (TPMS)</li> <li>● Demonstrate knowledge of service considerations of vehicles equipped with a TPMS</li> </ul>

	<ul style="list-style-type: none"> <li>● Rotate tires according to manufacturer's recommendations</li> <li>● Balance wheel and tire assembly (static and dynamic)</li> <li>● Dismount, inspect, and remount tire on wheel</li> <li>● Repair tire using internal patch</li> <li>● Reinstall wheel; torque lug nuts</li> </ul>
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<b>MLR 10: Students will inspect, diagnose and repair brake assembly.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>MLR 10.1 Diagnose and repair brake fluid system.</p> <ul style="list-style-type: none"> <li>● Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and support; determine necessary action</li> <li>● Select, handle, and fill brake fluids to proper level</li> <li>● Bleed brake system</li> <li>● Test brake fluid for contamination; determine necessary action</li> </ul>
Two Skill/Concept	<p>MLR 10.2 Inspect and repair brake shoes and drum assemblies.</p> <ul style="list-style-type: none"> <li>● Remove, clean, inspect and measure brake drums; determine necessary action</li> <li>● Refinish brake drum; measure final drum diameter</li> <li>● Remove, clean, inspect brake shoes, springs, pins, clips, levers, adjuster/self-adjuster, other related brake hardware, and backing support plates; lubricate and reassemble</li> <li>● Inspect and install wheel cylinders</li> <li>● Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings</li> <li>● Install wheel, torque lug nuts, and make final checks and adjustments</li> </ul>
Two Skill/Concept	<p>MLR 10.3 Inspect and repair caliper assembly.</p> <ul style="list-style-type: none"> <li>● Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action</li> <li>● Clean and inspect caliper mounting and slides/pins for wear, operation and damage; determine necessary action</li> <li>● Remove, inspect and replace pads and retaining hardware; determine necessary action</li> <li>● Reassemble, lubricate, and reinstall caliper, pads and related hardware; seat pads and inspect for leaks</li> </ul>
Two Skill/Concept	<p>MLR 10.4 Inspect and repair rotor assembly.</p> <ul style="list-style-type: none"> <li>● Clean, inspect and measure rotor thickness, lateral runout and thickness variation; determine necessary action</li> <li>● Remove and reinstall rotor</li> <li>● Refinish rotor on vehicle; measure final rotor thickness</li> <li>● Refinish rotor off vehicle; measure final rotor thickness</li> <li>● Install wheel. Torque lug nuts and make final checks and adjustments</li> </ul>
One Recall	<p>MLR 10.5 Inspect and repair vacuum supply.</p> <ul style="list-style-type: none"> <li>● Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster</li> </ul>

	<ul style="list-style-type: none"> <li>● Inspect vacuum-type power booster unit for leaks; inspect the check valve for proper operation; verify proper booster function</li> <li>● Demonstrate knowledge of the causes of wheel bearing noises, wheel shimmy and vibration concerns</li> <li>● Check parking brake cables and components for wear, binding and corrosion; clean, lubricate, adjust or replace as needed</li> </ul>
Two Skill/Concept	<p>MLR 10.6 Inspect and repair brake indicator light components.</p> <ul style="list-style-type: none"> <li>● Check parking brake and indicator light system operation; determine necessary action</li> <li>● Check operation of brake stop light system; determine necessary action</li> <li>● Replace tapered roller wheel bearing and race</li> <li>● Clean, inspect, lubricate, install and adjust wheel bearing</li> <li>● Identify and inspect electronic brake control system components; determine necessary action</li> <li>● Demonstrate knowledge of the operation of the brake hydraulic failure warning light</li> </ul>

<b>MLR 11: Students will inspect, test and repair electrical/electronic systems.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
One Recall	<p>MLR 11.1 Diagnose electrical circuit problems.</p> <ul style="list-style-type: none"> <li>● Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law)</li> <li>● Demonstrate use of wiring diagrams during diagnosis of electrical circuit problems</li> <li>● Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including source voltage, voltage drop, current flow and resistance</li> <li>● Check electrical circuits with a test light; determine necessary action</li> <li>● Check electrical circuits using fused jumper wires; determine necessary action</li> <li>● Demonstrate knowledge of the causes and effects of shorts, grounds, opens and resistance problems in electrical/electronic circuits</li> <li>● Measure key-off battery drain (parasitic draw); determine necessary action</li> <li>● Inspect and test fusible links, circuit breakers and fuses; determine necessary action</li> <li>● Inspect and test switches, connectors, relays and wires of electrical/electronic circuits</li> <li>● Repair connectors and terminal ends</li> <li>● Perform solder repair of electrical wiring</li> </ul>
Two Skill/Concept	<p>MLR 11.2 Inspect and repair battery problems.</p> <ul style="list-style-type: none"> <li>● Perform battery state-of-charge test; determine necessary action</li> <li>● Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action</li> <li>● Maintain or restore electronic memory functions</li> <li>● Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps and hold-downs</li> </ul>

	<ul style="list-style-type: none"> <li>● Perform battery charge</li> <li>● Start a vehicle using jumper cables and a battery or auxiliary power supply</li> </ul>
Two Skill/Concept	<p>MLR 11.3 Diagnose and repair starter.</p> <ul style="list-style-type: none"> <li>● Perform starter current draw tests; determine necessary action</li> <li>● Perform starter circuit voltage drop tests; determine necessary action</li> <li>● Inspect and test starter relays and solenoids; determine necessary action</li> <li>● Remove and replace starter</li> </ul>
Two Skill/Concept	<p>MLR 11.4 Diagnose and repair charging system.</p> <ul style="list-style-type: none"> <li>● Perform charging system output test; determine necessary action</li> <li>● Remove and replace generator (alternator)</li> <li>● Diagnose the cause of dim, or no light operation; determine necessary action</li> <li>● Inspect, replace, and aim headlights and bulbs</li> </ul>

<b>MLR 12: Students will inspect, diagnose and repair heating and air conditioning.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>MLR 12.1 Identify and visually inspect A/C system components.</p> <ul style="list-style-type: none"> <li>● Locate refrigerant label and identify specified refrigerant type (e.g., R-12, R-134a)</li> <li>● Conduct preliminary performance test of A/C system and determine necessary action</li> <li>● Conduct performance test of the heater/ventilation system</li> <li>● Inspect and replace cabin air filter</li> </ul>

<b>MLR 13: Students will inspect, diagnose and improve engine performance.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
Two Skill/Concept	<p>MLR 13.1 Perform the necessary tests and repairs to improve engine performance.</p> <ul style="list-style-type: none"> <li>● Perform engine cranking and running vacuum tests; determine necessary action</li> <li>● Perform cylinder power balance test; determine necessary action</li> <li>● Perform cylinder cranking compression test; determine necessary action</li> <li>● Perform cylinder leakage test; determine necessary action</li> <li>● Verify engine operating temperature; determine necessary action</li> <li>● Retrieve and record stored diagnostic trouble codes, On-Board Diagnostics (OBD) monitor status and freeze frame data; clear codes when applicable</li> <li>● Obtain and interpret scan tool data</li> <li>● Perform fuel pressure test</li> <li>● Replace fuel filters</li> <li>● Remove and replace secondary ignition components</li> <li>● Remove and replace thermostat and gasket/seal</li> <li>● Perform common fastener and thread repair, to include: removing broken bolt, restoring internal and external threads, and repairing internal threads with a threaded insert</li> </ul>

<b>MLR 14: Students explore career opportunities in the transportation, distribution and logistics career cluster and develop leadership skills.</b>	
<i>Webb Level</i>	<i>Sub-indicator</i>
One Recall	MLR 14.1 Research career opportunities in the transportation, distribution and logistics fields. <ul style="list-style-type: none"><li>● Utilizing career exploration software, research and write a report on career opportunities in the field</li><li>● Utilizing career exploration software, research educational requirements for a chosen career path</li><li>● Utilizing career exploration software, update student portfolio</li></ul>