

Colorado CTE Course – Scope and Sequence

Course Name	Maintenance and Light Repair II		Course Details	Credit = 1.0 CTE Credential- CTE Transportations	
			Course = 0.50 Carnegie Unit Credit		
Course Description	MLR II is the second course in the Automotive Maintenance and Light Repair program of study and covers important skills and knowledge on becoming a professional service technician. The Maintenance and Light Repair II (MLR II) course prepares students for entry into Maintenance and Light Repair III. Students study automotive general electrical systems, starting and charging systems, batteries, lighting, and electrical accessories. Students who successfully complete all MLR courses will have the knowledge needed to pass the ASE certification exam for MLR. Students who pass the exam and meet the work-based requirement will be eligible and encouraged to enter the workforce as an ASE-Certified MLR Technician.				
Note:	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.				
SCED Identification #	20104	Schedule calculation based on 60 calendar days of a 90-day semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.			
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at https://www.cde.state.co.us/standardsandinstruction/essentialskills					
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Safety		Demonstrate the practice of personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards. Perform work safety according to industry standards and with appropriate personal protective equipment.	Use and inspect personal protective equipment. Demonstrate appropriate related safety procedures. Students are expected to: (A) Inspect, maintain, and employ safe operating procedures with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment;	Complete all work demonstrating industry safety practices included appropriate use of PPE. Research an automotive-related safety incident. Analyze the issue and present a best practice for corrective action and to prevent the incident in the future.	

			<p>(B) Demonstrate continuous awareness of potential hazards to self and others and respond appropriately;</p> <p>(C) Assume responsibilities under HazCom (Hazard Communication) regulations;</p> <p>(D) Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies to protect coworkers and bystanders from hazards; reporting of accidents and observed hazards; and regarding emergency response procedures.</p> <p>(E) Pass with 100% accuracy a written examination relating to safety issues relating specifically to Maintenance and Light Repair.</p> <p>(F) Pass with 100% accuracy a performance examination relating to safety issues relating specifically to Maintenance and Light Repair.</p>		
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			(G) Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.		
Electrical Systems		Demonstrate an understanding of mechanical and electrical components in relation to industry and manufacturer standards. Use and apply industry knowledge and technical skills to test, diagnose, repair, and service general automotive electrical systems.	<p>Students will use and apply knowledge to test, diagnose and service general electrical automotive issues. Students are expected to:</p> <p>(A) Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins;</p> <p>(B) Demonstrate knowledge of electrical/electronic series, parallel, and series parallel circuits using principles of electricity (Ohm's Law);</p> <p>(C) Use wiring diagrams to trace electrical/electronic circuits;</p> <p>(D) Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop</p>	<p>Research or examine a case study on a common electrical or electronics issue in automobiles today. Report on the findings and include recommendations for technicians.</p> <p>See NATEF Task List</p>	

			<p>(including grounds), current flow, and resistance;</p> <p>(E) Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits;</p> <p>(F) Check operation of electrical circuits with a test light;</p> <p>(G) Check operation of electrical circuits with fused jumper wires;</p> <p>(H) Measure key-off battery drain (parasitic draw);</p> <p>(I) Inspect and test fusible links, circuit breakers, and fuses; determine necessary action;</p> <p>(J) Perform solder repair of electrical wiring; and</p> <p>(K) Replace electrical connectors and terminal ends.</p>		
Batteries		<p>Use and apply industry knowledge and technical skills to inspect, test, and service a vehicle battery. Use scientific principles in relation to chemical, mechanical, and physical</p>	<p>Inspect, test, and service vehicle batteries. Student is expected to:</p> <p>(A) Perform battery state-of-charge test; determine necessary action;</p>	<p>Research the capacity for several automotive batteries. Investigate the batteries materials and report on how the materials influence capacity. See NATEF Task List</p>	

		<p>functions for various engine and vehicle systems. Apply scientific principles to solve a technical problem or issue.</p>	<p>(B) Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action;</p> <p>(C) Maintain or restore electronic memory functions;</p> <p>(D) Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold downs;</p> <p>(E) Perform slow/fast battery charge according to manufacturer's recommendations;</p> <p>(F) Jump-start vehicle using jumper cables and a booster battery or auxiliary power supply;</p> <p>(G) Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions;</p> <p>(H) Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery; and</p>		
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			(I) Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.		
Vehicle Charging Systems		Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards. Demonstrate maintenance, diagnosis, service, and repair of starting and charging systems.	Students will inspect, test, service, and repair vehicle starting and charging systems. Students are expected to: <ul style="list-style-type: none"> (A) Perform starter current draw test; determine necessary action; (B) Perform starter circuit voltage drop tests; determine necessary action; (C) Inspect and test starter relays and solenoids; determine necessary action; (D) Remove and install starter in a vehicle; (E) Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action; (F) Perform charging system output test; determine necessary action; (G) Inspect, adjust, or replace generator (alternator) drive belts; 	See NATEF Task List	

			<p>check pulleys and tensioners for wear; check pulley and belt alignment; (H) Remove, inspect, and re-install generator (alternator); (I) Perform charging circuit voltage drop tests; determine necessary action; (J) Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights) and replace as needed; (K) Aim headlights; and (L) Identify system voltage and safety precautions associated with high-intensity discharge headlights.</p>		
Vehicle Accessory Systems		<p>Diagnose, service, and repair lighting systems. Diagnose, service, and repair horns, wipers/washers, and other accessories.</p>	<p>Students will inspect, test, service, and repair vehicle lighting and accessory systems. Students will be able to: (A) Disable and enable airbag system for vehicle service; verify indicator lamp operation; and (B) Remove and reinstall door panel; and (C) Describe the operation of keyless</p>	See NATEF Task List	

