CareerClusters™ PATHWAYS TO COLLEGE & CAREER READINESS
Transportation, Distribution & Logistics

Learning that works for Colorado CTE®

Colorado CTE Course – Scope and Sequence

Course Name	Basic Automotive Electricity	Course Details Course = 0.50 Carnegie Unit Credit	Credit = .5 Prerequisite: CTE Credential= CTE Transportation
Course Description	Basic Automotive Electricity introduces vehicle electricity and includes basic electrical theory, circuit designs, and wiring methods. It also focuses on multimeter usage and wiring diagrams.		
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 #	20107	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		Identify employers' expectations regarding safe and appropriate work habits, ethical conduct, and environmental responsibilities in the fields of automotive service. Practice personal and occupational safety and understand the environmental effects of automotive service practices.	Demonstrate safety in the shop environment. Student is expected to: (A) demonstrate shop orientation knowledge, practices, policies, and procedures; (B) demonstrate shop safety and use personal protective equipment; (C) understand hybrid, supplemental restraint systems (SRS), and electronic brake control systems safety precautions; (D) understand safety for high voltage circuits; and (E) locate and apply safety data sheets (SDS).	Student demonstrates safe employment shop practices: • Identifies general shop safety rules and procedures. • Utilizes safe procedures for handling of tools and equipment. • Utilizes proper ventilation procedures for working within the lab/shop area. • Identifies the location and the types of fire extinguishers and other fire safety equipment; demonstrates knowledge of the procedures for using	

				fire extinguishers and other safety equipment. • Complies with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. Demonstrates awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. Demonstrates awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). Locates and demonstrates knowledge of safety data sheets (SDS).	
Power, Magnetism and Electricity		Understand the scientific principles related to power and electricity.	Student understands and applies concepts of power and electricity to automobiles. Student is expected to: (A) understand power and calculations; (B) understand properties of Magnetism'	State basics of Electron Theory: • Conductors, semi-conductors and Insulators • Current flow theory - electron, conventional Demonstrates knowledge of electrical/electronics series, parallel, and series-parallel	

			(C) understand atoms and their relation to energy (Electron Theory); (D) understand voltage, voltage calculations; (E) understand Ohm's law and its relationship to voltage, resistance, and amperage. (F) understands direct and alternating current; (G) understands electrical circuits (series, parallel, and series and parallel) (H) understands voltage drop	circuits using principles of electricity (Ohm's Law). P-1 Uses wiring diagrams to trace electrical/electronic circuits. P-1 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. P-2 Checks operation of electrical circuits with a test light. P-2 Checks operation of electrical circuits with fused jumper wires. P-2	
Batteries and Testing		Understand vehicle batteries and testing mechanisms.	Student is expected to: (A) understand how batteries work. (B) understand and apply technical skills for the testing of automotive batteries, including the use of digital multimeters and; (C) understand and apply concepts of electrical measurements.	Measures key-off battery drain (parasitic draw). P-1 Demonstrates proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. P-1	
Starting and Charging Systems		Understand the starting and charging systems of vehicles.	Understand the Starting System. Student is expected to: (A) understand the starter current draw test (B) Understand the starter circuit voltage drop tests (C) understand the Starter relays and solenoids	Performs starter current draw test; determines necessary action. P-1 Perform starter circuit voltage drop tests; determine necessary action. P-1 Inspects and tests starter relays and solenoids;	

			(D) understand starter removal and installation (E) understand test switches, connectors, and wires of starter control circuits. Understand the Charging System. Student is expected to: (A) Understand the Output test and how it is used; (B) Understand generator drive belts (alternator); and (C) understand charging circuits voltage drop test	determine necessary action. P-2 Removes and installs starter in a vehicle. P-1 Inspects and test switches, connectors, and wires of starter control circuits; determines necessary action. P-2 Inspects and tests fusible links, circuit breakers, and fuses; determines necessary action. P-1 Performs charging system output test; determines necessary action. P-1 Inspects, adjusts, or replaces generator (alternator) drive belts; check pulleys and tensioners for wear; checks pulley and belt alignment. P-1 Removes, inspects, and re-installs generator (alternator). P-2 Performs charging circuit voltage drop tests; determines necessary action. P-1	
Electrical Symbols and Diagrams		Understand electrical symbols and wiring diagrams for automotive vehicles.	Understand Electrical Symbols and Wiring Diagrams. Student is expected to: (A)Read and apply automotive electrical wiring diagrams; and (B) Understand power source, control, load, and ground	Reforms solder repair of electrical wiring. P-1 Replaces electrical connectors and terminal ends. P-1	

Battery Services and Troubleshooting		Performs vehicle battery services.	Student uses electrical and technical knowledge to perform basic vehicle battery services. Student is expected to: (A) Perform battery services, including: • State-of-charge test • Determine Battery capacity • Restore Electronic memory functions • Check battery, battery cells, battery cables, connectors, clamps, and hold-downs • Slow/fast battery charge • Jump-start Understand High-voltage circuits of electric or hybrid electric vehicle and related safety precautions. Identify electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery. Understand Hybrid vehicle auxiliary (12volt) battery.	Performs battery state-of-charge test; determines necessary action. P-1 Confirms proper battery capacity for vehicle application; performs battery capacity test; determines necessary action. P-1 Maintains or restores electronic memory functions. P-1 Inspects and cleans battery; fills battery cells; checks battery cables, connectors, clamps, and hold-downs. P-1 Performs slow/fast battery charge according to manufacturer's recommendations. P-1 Jump-starts vehicle using jumper cables and a booster or an auxiliary power supply. P-1 Identifies high-voltage circuits of electric or hybrid electric vehicle and related safety precautions. P-3 Identifies electronic modules, security systems, radios, and other accessories that require re-initialization or code entry after reconnecting vehicle battery. P-1 Identifies hybrid vehicle auxiliary (12volt) battery service, repair, and test procedures. P-3	

Supplemental Restraints Systems (Air Bags)		Use and apply information to inspect and repair vehicle supplemental restraints systems.	Understand electrical applications to vehicle supplemental restraints systems.	Diagnoses supplemental restraint system (SRS) concerns; determines necessary action. Disables and enables supplemental restraint system (SRS). P-1	
Vehicle Computer Systems		Use and apply information to inspect and repair vehicle computer systems.	Understand electrical applications to vehicle computer systems. Student is expected to understand electrical systems related to: (A) brakes (general and hydraulic) (B) Power-Assist Units (C) Miscellaneous (Wheel Bearing, parking, other electrical, Etc.) (D) electronic breaks and traction control systems (E) suspension and steering (F) wheels and tires	Describes procedure for performing a road test to check brake system operation; including an anti-lock brake system (ABS). P-1 Identifies components of brake warning light system. P-1 Checks brake pedal travel with, and without, engine running to verify proper power booster operation. P-2 Checks vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. P-1 Checks parking brake operation and parking brake indicator light system operation; determines necessary action. P-1 Checks operation of brake stop light switch. P-1 Identifies traction control/vehicle stability control system components. P-3 Describes the operation of a regenerative braking system. P-3	

				Inspects electric power-assisted steering. P-3 Dismounts, inspects, and remounts tire on wheel equipped with tire pressure monitoring system sensor. P-2 Identifies and tests tire pressure monitoring systems (indirect and direct) for operation; verifies operation of instrument panel lamps. P-2 Demonstrates knowledge of steps required to remove and replace sensors in a tire pressure monitoring system. P-2 Identifies hybrid vehicle power steering system electrical circuits and safety precautions. P-2 Describes the function of the power steering pressure switch. P-3	
