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

Learning that works for Colorado CTE®

Colorado CTE Course – Scope and Sequence

Course Name	Collision Repair: Non-structural	Course Details Course = 0.50 Carnegie Unit Credit	Credit= 1.0- 2.0 Prerequisite: Introduction to Collision Repair and Refinishing CTE Credential: CTE Transportation
Course Description	Collision Repair: Non-Structural is for students who wish to obtain in-depth knowledge and skills in repair procedures for non-structural repairs in preparation for postsecondary training and careers as collision repair technicians. Upon completion of this course, proficient students will be able to analyze non-structural collision damage and write and revise repair plans. Students will read and interpret technical texts to determine, understand, and safely perform appropriate repair techniques and procedures. Standards in this course include preparing vehicles for repair, removing and replacing panels and body components, metal finishing, body filling, removing and replacing moveable glass and hardware, metal welding and cutting, and repair of plastics.		
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 #	20116	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
Career Development		Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to: A) demonstrate an understanding of workplace safety and environmental responsibilities regarding automotive collision repair and understand the use of personal protective equipment;	Understand the certification requirements for the ASE and ICAR certification for Collision Repair. Cultivate positive leadership skills. Take part in opportunities to practice and demonstrate personal	

		manage personal career plans. Develop an education and career plan aligned with personal goals and employment in the automotive service industry.	B) identify employment opportunities, including entrepreneurship opportunities, and certification requirements for the fields of collision repair; C) demonstrate the principles of group participation and leadership related to citizenship and career preparation; D) identify employers' expectations and appropriate work habits; E) review the competencies related to resources, information systems, and technology; and F) apply reasoning skills to a variety of workplace situations in order to make ethical decisions. The student relates core academic skills to the requirements of collision repair. The student is expected to: A) apply effective oral and written communication skills with individuals from various cultures such as fellow workers, management, and customers; B) use technical writing skills to complete collision repair orders and related paperwork; C) locate, read, and interpret documents such as service and repair information, technical bulletins, specifications, schematics, and parts catalogs; and D) apply mathematical skills to the estimating process such as establishing	leadership skills. For example, taking advantage of opportunities provided by a career and technical student organization (CTSO), such as SkillsUSA. Assess situations, apply problem-solving techniques and decision-making skills within the school, community, and workplace. Participate as a team member in a learning environment. Respect the opinions, customs, and individual differences of others. Build personal career development by identifying career interests, strengths, and opportunities for employment and school work-based learning options.	

			charges and totals, profit margins, technician productivity, and shop efficiency.		
Safety		Students practice personal and occupational safety and understand the environmental effects of collision repair and refinishing practices.	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to: A) demonstrate an understanding of workplace safety and environmental responsibilities regarding automotive collision repair and understand the use of personal protective equipment; B) demonstrate the principles of group participation and leadership related to citizenship and career preparation; C) identify employers' expectations and appropriate work habits; and D) apply reasoning skills to a variety of workplace situations in order to make ethical decisions. The student knows the function and application of tools, equipment, technologies, and materials used in collision repair. The student is expected to: A) use hand and power tools and equipment commonly employed in collision repair, according to industry safety standards; B) identify proper welding and cutting techniques and processes in collision repair;	Comply with personal and environmental safety practices associated with clothing and the use of gloves; respiratory protection; eye protection; hearing 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. Identify vehicle manufacturer's SRS types, locations, and recommended procedures before inspecting or replacing components. Use and inspect personal protective equipment every time equipment is used. Inspect, maintain, and employ safe operating procedures with tools	

			C) properly handle and dispose of environmentally hazardous materials used in collision repair and refinishing technologies; and D) demonstrate knowledge of new and emerging collision repair technologies.	and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment. Assume responsibilities under HazCom (Hazard Communication) regulations d. Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards, and regarding emergency response procedures. Maintain a portfolio record of written safety examinations and equipment examination for which the student has passed an operational checkout by the instructor f. Utilize MSDSs (material safety data sheets), and identify the health hazards associated with hazardous material.	
Collision Industry Foundations		Use technical vocabulary, technical reports and	The student understands the technical knowledge and skills of collision repair. The student is expected to:	Read and interpret a damage report and observe damages, synthesizing information	

		manuals, electronic systems, and related technical data resources, as appropriate, to determine repairs and estimates. Use industry-standard measurement scales, devices, and systems to perform design, fabrication, diagnostic, maintenance, and repair procedures. Understand how certain tools and equipment are used to perform maintenance and repair operations.	A) demonstrate an understanding of basic types of repair procedures for the different types of vehicle body construction used in the auto collision industry; B) demonstrate an understanding of pre-repair and repair inspection of non-damaged components; C) demonstrate the proper preparation, application, and refinishing of various paint products; D) estimate parts and labor costs of collision repair; and E) perform precision measurements to diagnose vehicle body shape and frame alignment angles.	from both text and observation to create a basic repair plan for a damaged automobile. Citing resources such as instructional manuals, textbooks, example work orders, and other resources, create a written overview of the steps necessary to repair the vehicle. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.	
Basic Preparation		Perform and document repair procedures in accordance	The student applies the technical knowledge and skills of damage analysis to simulated or actual work situations. The student is expected to:	Describe and demonstrate the steps necessary to prepare an automobile for non-structural repair.	

		with manufacturer recommendations and industry standards. Prepare and analyze vehicles for repair.	A) prepare vehicle for inspection by providing access to damaged areas; B) analyze damage to determine appropriate methods for overall repairs; C) perform visual inspection of structural components and members; D) identify structural damage using measuring tools and equipment; E) perform visual inspection of non-structural components and members; F) determine parts, components, material type(s), and procedures necessary for a proper repair; G) identify type and condition of finish and determine if refinishing is required; H) identify suspension, electrical, and mechanical component physical damage; I) identify safety systems physical damage; J) identify interior component damage; K) identify damage to add-on accessories and modifications; and L) identify single/one-time use components.	Synthesize information gathered from textbooks, online resources, and firsthand experiences observing a qualified technician to create a list of tools, equipment, and materials needed for each step of preparation. Write a description of the responsibilities and procedures of the repair technician, emphasizing safety procedures in each of the following. a. Inspect, remove, label, store, and reinstall exterior trim and moldings. b. Inspect, remove, label, store, and reinstall interior trim and components. c. Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair. d. Inspect, remove, label, store, and	

				reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair. e. Protect panels, glass, interior parts, and other vehicles adjacent to the repair area. f. Soap and water wash entire vehicle; complete pre-repair inspection checklist. g. Prepare damaged area using water-based and solvent-based cleaners. h. h. Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs. i. i. Inspect, remove, and	

				reinstall repairable plastics and other components for off-vehicle repair	
Outer Body Panels		Perform outer body panel repairs, replacements, and adjustments.	The student applies the technical knowledge and skills of collision repair and refinishing to simulated or actual work situations. The student is expected to: A) perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations; B) identify types of vehicle construction materials and associated repair methods; C) identify methods of collision energy management and types of damage; D) determine vehicle damage and prepare an estimate of the repair costs; E) determine body panel damage and identify the associated repair methods, including inspection, disassembly, and repair or replacement of components; F) inspect, remove, replace, and align various body components such as hoods, hinges, latches, and bumper covers; G) identify types of vehicle finishes and associated refinish techniques; H) inspect, remove, and replace bolted, bonded, and welded panels or panel assemblies; I) identify vehicle occupant restraint systems and associated repair methods;	Read and interpret technical information regarding direct and indirect/hidden damage and direction of impact. Examine case studies to create a library of various damages incurred on a range of vehicle types. Hypothesize the direction of impact of each, citing evidence to justify claims. Use the information to investigate and report on the damage incurred in outer body panels of given vehicles. Drawing on research and feedback from instructors and peers, review, edit, and revise repair plans, using technology where appropriate. a. Determine the extent of direct and indirect/hidden damage and	

			J) identify vehicle body components and assess for repair or replacement; K) demonstrate the welding and cutting processes used in vehicle collision repair; L) remove, install, and adjust vehicle mechanical systems and electrical components; M) identify and determine the cause of paint and refinishing defects; N) discuss interior and exterior trim repair; O) discuss corrosion protection, including sealers, adhesives, and under-coatings; P) prepare damaged area using water-based and solvent-based cleaners; Q) demonstrate vehicle detailing; R) restore sound deadeners and foam materials; and S) diagnose and repair water leaks, dust leaks, and wind noise.	direction of impact; develop and document a repair plan. Distinguish among the various panels and components of a vehicle's outer body. Compare and contrast the tools, equipment, and procedures for inspecting, removing, replacing, and aligning each of the following. Summarize the key considerations and procedures an automotive technician should discern when performing the following processes in a written, oral, or visual presentation, citing evidence from resources such as instructional videos, manuals, tutorials, and other resources. Demonstrate the proper steps in inspecting the components of a vehicle's outer body. a. Inspect, remove and replace bolted, bonded, and welded steel	

				panel or panel assemblies. b. Determine the extent of damage to aluminum body panels; repair or replace. c. Inspect, remove, replace, and align hood, hood hinges, and hood latch. d. Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. e. Inspect, remove, replace, and align doors, latches, hinges, and related hardware. f. Inspect, remove, replace and align tailgates, hatches, liftgates, and sliding doors. g. Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators,	

				and mounting hardware. h. Inspect, remove, replace and align fenders, and related panels. Use the proper tools and procedures to repair outer body panels: a. Straighten contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pulling attachments. b. Weld damaged or torn steel body panels; repair broken welds. c. Restore corrosion protection. d. Replace door skins. e. Restore sound deadeners and foam materials.	

				f. Perform panel bonding and weld bonding. g. Diagnose and repair water leaks, dust leaks, and wind noise. h. Identify one-time use fasteners.	
Metal Welding and Cutting		Demonstrate the different types of welding and heat processes used in repair processes and procedures. Demonstrate the principles of metal welding and cutting.	The student knows the function and application of tools, equipment, technologies, and materials used in collision repair. The student is expected to: A) use hand and power tools and equipment commonly employed in collision repair, according to industry safety standards; B) identify proper welding and cutting techniques and processes in collision repair; C) properly handle and dispose of environmentally hazardous materials used in collision repair and refinishing technologies; and D) demonstrate knowledge of new and emerging collision repair technologies.	Compare and contrast the different tools, procedures, and welding methods used to weld and cut aluminum, high-strength steels, and other steels, noting when substrates are weldable. Create a chart or other visual display describing the tools, tool settings, procedures, and methods for welding in a variety of situations. Perform basic welding and cutting of aluminum and steel. a. Identify weldable and non-weldable substrates used in vehicle construction. b. Weld and cut high-strength	

				steel and other steels. c. Weld and cut aluminum. d. Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation. e. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded. f. Store, handle, and install high-pressure gas cylinders. g. Determine work clamp (ground) location and attach. h. Use the proper angle of the gun	

				to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions. Describe and demonstrate strategies used to prepare vehicle body components for welding. Write persuasively to describe the key procedures, justifying the need for each by citing information gathered from textbooks, online resources, and other resources. a. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. b. Protect computers and other electronic control modules during welding procedures.	

				c. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld through primer if necessary, clamp or tack as required. Distinguish among the various types of weld and joint type. Emphasizing proper safety equipment and techniques, implement the appropriate tools, equipment, techniques, and procedures to perform a variety of welds. a. Determine the joint type (butt weld with backing, lap, etc.) for weld being made. b. Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation. c. Perform the following welds:	

				continuous, plug, butt weld with and without backing, fillet, etc. Identify and demonstrate basic inspection and troubleshooting strategies appropriate for evaluating welds. Use the knowledge to remedy the problem. a. Perform visual and destructive tests on each weld type. b. Identify the causes of various welding defects; make necessary adjustments. c. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. Research, explore, and perform a range of procedures used to cut and attach non-structural components, noting when each method is commonly	

				used based on information gathered from textbooks and online resources.) a. Identify cutting process for different substrates and locations; perform cutting operation. b. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.).	
Plastics and Adhesives		Identify and understand the physical and chemical characteristics of metals, plastics, and other materials.	The student applies the technical knowledge and skills of plastics and adhesives to simulated or actual work situations. The student is expected to: A) identify the types of plastics used in automotive applications; B) clean and prepare the surface of plastic parts; C) repair rigid, semi-rigid, or flexible plastic panels; D) remove or repair damaged areas from rigid exterior composite panels; and	Given damaged plastic components, use resources such as textbooks, OEM manuals, diagrams, and material instructions to identify the nature of the problem and complete appropriate repair. Develop a graphic illustration to identify and describe the types of plastic repair procedures, emphasizing	

			E) replace bonded rigid exterior composite body panels, including straightening or aligning panel supports.	the conditions which require each type of procedure. Select the appropriate repair procedures and justify the selection with evidence drawn from the resources listed above. a. Identify the types of plastics; determine repairability. b. Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures. c. Repair rigid, semi-rigid, or flexible plastic panels. d. Remove or repair damaged areas from rigid exterior composite panels. e. Replace bonded rigid exterior composite body panels; f. straighten or align panel supports	

Metal Finishing and Body Filling (optional)		Prepare vehicles for metal finishing and body filling.	The student applies the technical knowledge and skills of metal finishing and body filling to simulated or actual work situations. The student is expected to: A) remove paint from damaged area of a body panel; B) identify and repair surface irregularities on a damaged body panel; C) demonstrate hammer and dolly techniques for dent repair; D) heat shrink stretched panel areas to proper contour; E) cold shrink stretched panel areas to proper contour; F) identify, prepare, and apply body filler; G) rough sand body filler to contour panel and finish sand for the application of primer; H) determine the proper metal finishing techniques for aluminum; and I) determine the proper application of body filler to aluminum.	Examine the processes, tools, and materials involved in applying body filling and finishing metal. Read and interpret instructions to prepare materials such as mixing instructions for body filler. Consult a range of resources which outline minor body repair processes for a variety of damage types. Assess the authors' claims and determine the usefulness of each source. Appropriately use the research to recommend and complete the proper repair procedures for given body panel damages. a. Remove paint from the damaged area of a body panel. b. Locate and repair surface irregularities on a damaged body panel. c. Demonstrate hammer and dolly techniques. d. Heat shrink stretched panel	

				areas to proper contour. e. Cold shrink stretched panel areas to proper contour. f. Prepare and apply body filler. g. Identify different types of body fillers. h. Rough sand body filler to contour; finish sand. i. Determine the proper metal finishing techniques for aluminum. j. Determine proper application of body filler to aluminum.	
Moveable Glass (optional)		Demonstrate applications, installations, and removal of fixed and moveable glass and hardware.	The student applies the technical knowledge and skills of moveable glass and hardware to simulated or actual work situations. The student is expected to: A) inspect, adjust, repair, or replace window systems such as regulators, run channels, glass, power mechanisms, and related controls; B) inspect, adjust, remove, repair, or reinstall body sealing systems such as weather stripping;	Read and interpret technical information to define the structure, purpose, and function of moveable glass and hardware system components and demonstrate appropriate repairs of each. Create a written, oral, or visual presentation describing the proper procedures	

			C) inspect, adjust, repair, or replace regulators, run channels, glass, power mechanisms, and related controls for roof panel options such as sun roofs and convertible tops; and D) inspect, remove, reinstall, and align convertible tops and related mechanisms.	for each of the following, drawing on information from textbooks, OEM manuals, diagrams, demonstrations, and other instructional narratives: a. Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls. b. Inspect, adjust, repair, remove, reinstall or replace weather-stripping. c. Inspect, repair or replace, and adjust removable power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. d. Inspect, remove, reinstall, and align convertible	

				top and related mechanisms. e. Initialize electrical components as needed.	
Intro to Estimating		Use reference books and materials, technical service bulletins, and other related documents to determine repairs and rate of pay. Use technical vocabulary, technical reports and manuals, electronic systems, and related technical data resources, as appropriate, to determine repairs and estimates.	The student applies the technical knowledge and skills of estimating in simulated or actual work situations. The student is expected to: A) locate and record customer/vehicle owner information; B) locate and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant; C) identify and record vehicle options, including trim level, paint code, accessories, and modifications; D) identify the safety systems; E) apply appropriate estimating and parts terminology; F) determine and apply appropriate estimating sequence; G) utilize estimating guide procedure pages; H) estimate labor time for operations; I) select appropriate labor rates for each operation such as structural, non-structural, mechanical, and refinish; J) select and price replacement parts such as original equipment manufacturer (OEM), alternative/optional OEM, aftermarket, recycled/used, remanufactured, rebuilt, and reconditioned parts;	Read and interpret a damage report and observe damages, synthesizing information from both text and observation to create a basic repair plan for a damaged automobile. Citing resources such as instructional manuals, textbooks, example work orders, and other resources, create a written overview of the steps necessary to repair the vehicle. a. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.	

			K) determine labor time, prices, charges, allowances, or fees for non-included operations and miscellaneous items; L) determine additional material and charges such as environmental, administrative, shop, and disposal fees; M) determine refinishing material and charges; N) review computer-assisted and manually written estimates and verify that the information is correct; O) identify labor time and material charges for restoring corrosion protection; and P) determine the approximate vehicle retail value compared to the repair cost.		