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

Learning that works for Colorado CTE®

Colorado CTE Course – Scope and Sequence

Course Name	Collision Refinishing	Course Details	Credit= 1.0- 2.0
		Course = 0.50 Carnegie Unit Credit	**Prerequisite: Introduction to Collision Repair and Refinishing** **CTE Credential: CTE Transportation**
Course Description	Collision Repair: Refinishing is designed to teach the concepts and theory of systems related to automotive paint and refinishing. Upon completion of this course, proficient students will be able to develop, document, and implement refinishing plans for given vehicles. Students will read and interpret technical texts to determine, understand, and safely perform appropriate refinishing techniques and procedures. Standards in this course include surface preparation; spray gun and related equipment operation, paint mixing, matching, and applying; diagnosis and correction of paint defects; and final detailing.		
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 manage	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to: (A) demonstrate awareness of workplace safety and environmental responsibilities in automotive paint and refinishing 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 leadership skills. For	

		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 field of automotive paint and refinishing; (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 paint and refinishing. The student is expected to: (A) demonstrate 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 paint and refinishing orders and related paperwork; (C) locate, read, and interpret documents such as service and repair information, technical bulletins,	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.	

			specifications, schematics, and parts catalogs; and (D) demonstrate competencies required to use and interpret service repair bulletins.		
Safety		Students practice personal and occupational safety and understand the environmental effects of collision repair and refinishing practices.	The student knows the function and application of tools, equipment, technologies, and materials used in paint and refinishing services. The student is expected to: (A) identify safety and personal health hazards according to Occupational Safety and Health Association (OSHA) guidelines and the "Right to Know Law"; (B) inspect spray environment and equipment to ensure compliance with federal, state, and local regulations and for safety and cleanliness hazards; (C) select, use, inspect, ensure fit and operation, and perform maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation of a National Institute of Occupational of Safety and Health (NIOSH) approved air purifying respirator; (D) select, use, and perform maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation for a NIOSH approved fresh air make-up respirator system;	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. Locate, read, and interpret federal, state, and local regulations	

				(E) select and use the proper personal safety equipment such as gloves, suits, hoods, and eye and ear protection; (F) use hand and power tools and equipment commonly employed in paint and refinishing technologies, according to industry safety standards; (G) properly handle and dispose of environmentally hazardous materials used in paint and refinishing technologies; and (H) demonstrate knowledge of new and emerging paint and refinishing technologies.	impacting the painting and refinishing of vehicles. Follow regulations and procedures to work safely around materials and equipment. a. Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. b. Identify safety and personal health hazards according to OSHA guidelines and the "Right to Know Law". c. Inspect spray environment and equipment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards. d. Select and use a NIOSH approved air purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.	

				e. Select and use a NIOSH approved supplied air (Fresh Air Make-up) respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. f. Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).	
Collision Industry Foundations		Use technical vocabulary, technical reports and manuals, electronic systems, and related technical data resources, as appropriate, to determine repairs and estimates. Use industry-standard	The student understands the technical knowledge and skills of paint and refinishing systems. The student is expected to: (A) demonstrate the basic types of refinishing procedures for the different types of vehicle body construction used in the auto refinishing industry; (B) demonstrate the proper preparation, application, and refinishing with various paint products, decals, and adhesives; (C) estimate parts and labor costs on paint and refinishing orders; and	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.	

		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.	(D) perform precision measurements of paint and materials. 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.	Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.	
Finish and Painting Precautions		Demonstrate the concepts, principles, and practices of painting and refinishing. Understand the environmental implications of using new and emerging materials, resources, and technologies.	The student knows the function and application of tools, equipment, technologies, and materials used in paint and refinishing services. The student is expected to: (A) identify safety and personal health hazards according to Occupational Safety and Health Association (OSHA) guidelines and the "Right to Know Law"; (B) inspect spray environment and equipment to ensure compliance with federal, state, and local regulations and for safety and cleanliness hazards;	Describe and demonstrate the steps necessary to prepare an automobile for non-structural repair. 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.	

		Practice the safe handling and storage of chemicals and hazardous wastes as required by the Occupational Safety and Health Administration (OSHA), Air Resources Board (ARB), Air Quality Management Districts (AQMDs), and other regulatory agencies.	(C) select, use, inspect, ensure fit and operation, and perform maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation of a National Institute of Occupational of Safety and Health (NIOSH) approved air purifying respirator; (D) select, use, and perform maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation for a NIOSH approved fresh air make-up respirator system; (E) select and use the proper personal safety equipment such as gloves, suits, hoods, and eye and ear protection; (F) use hand and power tools and equipment commonly employed in paint and refinishing technologies, according to industry safety standards; (G) properly handle and dispose of environmentally hazardous materials used in paint and refinishing technologies; and (H) demonstrate knowledge of new and emerging paint and refinishing technologies. The student applies the technical knowledge and skills of paint and refinishing to simulated or	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	

			actual work situations. The student is expected to: (A) perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations; (B) inspect types of vehicle construction materials and associated refinishing methods; (C) identify different types of vehicle finishes and associated refinish techniques; (D) inspect, identify, and determine the cause of paint and refinishing defects; (E) discuss corrosion protection; and (F) demonstrate vehicle detailing.	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. Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs. i. Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair	
Refinishing Preparation		Identify, use, and repair plastics and adhesives. Prepare surfaces for	The student applies the technical knowledge and skills of surface preparation to simulated or actual work situations. The student is expected to: (A) inspect and identify type of finish, surface condition, and film thickness	Create and publish a plan for refinishing using a total product system. Perform inspections to determine the condition of the vehicle. Examine resources such as	

		painting and finishing.	and develop and document a plan for refinishing; (B) featheredge areas to be refinished; (C) apply suitable metal treatment or primer; (D) mask and protect other areas that will not be refinished; (E) mix primer, primer-surfacer, or primer-sealer; (F) identify a complimentary color or shade of undercoat to improve coverage; (G) apply primer onto surface of repaired area; (H) remove dust from area to be refinished, including cracks or moldings of adjacent areas; (I) clean area to be refinished using a final cleaning solution; (J) remove, with a tack rag, any dust or lint particles from the area to be refinished; (K) apply suitable sealer to the area being refinished; (L) apply stone chip resistant coating;	instructional manuals, textbooks, case studies, and other resources to determine the considerations and steps to include in the refinishing plan, citing evidence to justify elements of the plan. Consult with the instructor and peers to edit and revise the plan. a. Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation. b. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants. c. Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system. Diagram the steps necessary to prepare the surfaces of a vehicle for painting. Synthesize information gathered from textbooks, online resources, and firsthand experiences observing a	

				(M) identify the types of rigid, semi-rigid, or flexible plastic parts to be refinished and determine the materials needed and preparation and refinishing procedures; and (N) identify metal parts to be refinished and determine the materials needed and preparation and refinishing procedures.	qualified technician to create a list of tools, equipment, and materials needed for each step of preparation. Create a visual display with supporting text outlining the responsibilities and procedures of the repair technician, noting the appropriate timing of each task. Perform proper procedures to prepare the surface of a vehicle. a. Strip paint to bare substrate (paint removal). b. Dry or wet sand areas to be refinished. c. Featheredge areas to be refinished. d. Apply suitable metal treatment or primer in accordance with total product systems. e. Mask and protect other areas that will not be refinished. f. Mix primer, primer-surfacer or primer-sealer. g. Identify a complimentary color or shade of undercoat to improve coverage.	

				h. Apply primer onto surface of repaired area. i. Apply two-component finishing filler to minor surface imperfections. j. Block sand area to which primer-surfacer has been applied. k. Dry sand area to which finishing filler has been applied. l. Remove dust from area to be refinished, including cracks or moldings of adjacent areas. m. Clean area to be refinished using a final cleaning solution. n. Remove, with a tack rag, any dust or lint particles from the area to be refinished. o. Apply suitable sealer to the area being refinished. p. Scuff sand to remove nibs or imperfections from a sealer. q. Apply stone chip resistant coating. r. Restore caulking and seam sealers to repaired areas. s. Prepare adjacent panels for blending. t. Identify the types of rigid, semi-rigid or	

				flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures. u. Identify metal parts to be refinished; determine the materials needed, preparation, and refinishing procedures.	
Spray Gun Techniques		Practice operation of spray guns and related equipment.	The student applies the technical knowledge and skills of spray gun and related components to simulated or actual work situations. The student is expected to: (A) inspect, clean, and determine condition of spray guns, spray environment, and related equipment such as air hoses, regulators, air lines, and air source; (B) select spray gun setup, including fluid needle, nozzle, and cap, for product being applied; (C) test and adjust spray gun using fluid, air, and pattern control valves; and (D) demonstrate an understanding of the operation of pressure spray equipment.	Read and interpret instructional manuals and other technical texts and observe demonstrations of qualified technicians to understand and demonstrate the proper procedures involved in operating a spray gun and related equipment. Use these texts to create a training document to instruct a new technician on maintaining and operating spray guns and related equipment. a. Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). b. Select spray gun setup (fluid needle, nozzle, and cap) for product being applied.	

				c. Test and adjust spray gun using fluid, air and pattern control valves. d. Demonstrate an understanding of the operation of pressure spray equipment.	
Paint		Practice mixing, matching, and applying paint.	The student applies the technical knowledge and skills of paint mixing, matching, and applying techniques to simulated or actual work situations. The student is expected to: (A) identify color code by manufacturer vehicle information label; (B) measure, shake, stir, reduce, catalyze/activate, and strain refinish materials; (C) apply finish using appropriate spray techniques, including gun arc, angle, distance, travel speed, and spray pattern overlap, for the finish being applied; (D) apply selected product on test or let-down panel and check for color match; (E) apply single stage topcoat; (F) apply basecoat and clearcoat for panel blending and panel refinishing; (G) apply basecoat and clearcoat for overall refinishing;	Identify paint mixing procedures by interpreting technical information such as technical manuals and manufacturer's websites. Differentiate the effects of paint ratios on the color and composition of paint to hypothesize possible outcomes of each ratio. Calculate proper formulations of paint based upon label directions using formulas. Demonstrate in a live setting or in a presentation the ability to follow painting instructions precisely as they pertain to selection, mixing, handling, and application. Demonstrate procedures to apply paint and refinish plastic parts using the appropriate	

				(H) remove nibs or imperfections from basecoat; (I) refinish rigid or semi-rigid plastic parts; (J) refinish flexible plastic parts; (K) apply multi-stage coats for panel blending and overall refinishing; (L) identify and mix paint using a formula; (M) identify poor hiding colors and determine necessary action; (N) tint color using formula to achieve a blendable match; (O) identify alternative color formula to achieve a blendable match; and (P) identify the materials, equipment, and preparation differences between petroleum and waterborne technologies.	tools, equipment, and materials. a. Identify color code by manufacturer's vehicle information label. b. Shake, stir, reduce, catalyze/activate, and strain refinish materials. c. Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied. d. Apply selected product on test or let-down panel; check for color match. e. Apply single stage topcoat. f. Apply basecoat/clearcoat for panel blending and panel refinishing. g. Apply basecoat/clearcoat for overall refinishing. h. Remove nibs or imperfections from basecoat. i. Refinish rigid or semi-rigid plastic parts. j. Refinish flexible plastic parts. k. Apply multi-stage coats for panel blending and overall refinishing.	

				l. Identify and mix paint using a formula. m. Identify poor hiding colors; determine necessary action. n. Tint color using formula to achieve a blendable match. o. Identify alternative color formula to achieve a blendable match. p. Identify the materials, equipment, and preparation differences between solvent and waterborne technologies.	
Paint Detailing		Prepare vehicles for final detail.	The student applies the technical knowledge and skills of final detailing to simulated or actual work situations. The student is expected to: (A) apply decals, transfers, tapes, woodgrains, and pinstripes such as painted and taped; (B) sand, buff, and polish fresh or existing finish to remove defects as required; (C) clean vehicle interior, exterior, and glass; (D) clean body openings such as door jambs and edges; (E) remove overspray; and	Explain and demonstrate the proper procedures to complete the final detailing for painting and refinishing projects. Create a checklist and guide a beginning technician could use to plan and perform procedures, noting common mistakes to avoid. a. Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc. b. Sand, buff and polish fresh or existing finish to remove defects as required.	

			(F) complete quality control using a checklist.	c. Clean interior, exterior, and glass. d. Clean body openings (door jambs and edges, etc.). e. Remove overspray. f. Perform vehicle clean-up; complete quality control using a checklist.	
Paint Defects		Analyze the causes and cures of paint defects.	Analyze issues related to paint mixing, matching, and applying techniques to simulated or actual work situations. The student is expected to: (A) Identify common painting defect and their causes; and (B) Identify techniques and solutions to correct painting defects.	Create a listing of a wide array of paint defects possible including detailed descriptions, causes, and solutions. Compare and contrast the characteristics and solutions of paint defects in a chart or other visual display. Demonstrate troubleshooting strategies appropriate for identifying and evaluating paint defects in given scenarios including consulting technical documents (such as textbooks and paint manufacturers' websites). Document findings in a technical report, citing evidence to recommend and justify the necessary correction procedures and methods to prevent future occurrences.	

				Perform proper procedures to correct paint defects. a. Identify blistering (raising of the paint surface, air entrapment); determine the cause(s) and correct the condition. b. Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition. c. Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition. d. Identify lifting; determine the cause(s) and correct the condition. e. Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition. f. Identify orange peel; determine the cause(s) and correct the condition. g. Identify overspray; determine the cause(s)	

				and correct the condition. h. Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition. i. Identify sags and runs in paint surface; determine the cause(s) and correct the condition. j. Identify sanding marks or sandscratch swelling; determine the cause(s) and correct the condition. k. Identify contour mapping/edge mapping while finish is drying; determine the cause(s) and correct the condition. l. Identify color difference (off-shade); determine the cause(s) and correct the condition. m. Identify tape tracking; determine the cause(s) and correct the condition. n. Identify low gloss condition; determine the cause(s) and correct the condition.	

				o. Identify poor adhesion; determine the cause(s) and correct the condition. p. Identify paint cracking (shrinking, splitting, crowsfeet or line-checking, microchecking, etc.); determine the cause(s) and correct the condition. q. Identify corrosion; determine the cause(s) and correct the condition. r. Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition. s. Identify water spotting; determine the cause(s) and correct the condition. t. Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition. u. Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition. v. Identify die-back conditions (dulling of the	

				paint film showing haziness); determine the cause(s) and correct the condition. w. Identify chalking (oxidation); determine the cause(s) and correct the condition. x. Identify bleed-through (staining); determine the cause(s) and correct the condition. y. Identify pin-holing; determine the cause(s) and correct the condition. z. Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition. Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition.	
