Maryland CTE Programs of Study

Introduction to Collision Repair (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 9-12. 1

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INTRODUCTION 2

A Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. 2.A

B The Supply Chain & Transportation Career Cluster encompasses the transfer, coordination, and management of goods from production to consumption, ensuring efficient movement across various modes of transportation including air, ground, and water, as well as Collision Repair and Refinishing of the respective transport modes. This Cluster integrates logistics and distribution networks to facilitate the seamless flow of materials and products, playing a crucial role in global commerce, economic development, and community health. 2.B

C The Automotive Collision and Repair program prepares students for careers in the automotive collision industry through a four-course sequence combining hands-on skills with technical knowledge. Students' progress from foundational safety and repair principles through advanced structural analysis and modern vehicle systems. Throughout the program, students master essential skills including metal straightening, welding, refinishing techniques, and structural repairs while gaining experience with industry-standard tools and equipment. Students learn to analyze damage, write estimates, repair panels, apply primers and paints, and work with advanced driver assistance systems (ADAS). The program aligns with ASE Education Foundation Entry-Level certifications: Non-structural Analysis & Damage Repair, Painting & Refinishing, and Structural Analysis & Damage Repair. Additionally, systems who use the I-CAR PDP-EE Curriculum may also earn ICAR Platinum ProLevel 1 credentials. These certifications position students for immediate employment in collision centers, dealerships, or custom shops, or continued education in advanced automotive programs. 2.C

D The Introduction to Collision Repair course introduces students to essential collision repair concepts and safety practices. Students will master workplace safety procedures, learn to identify different types of vehicle construction and

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materials, perform basic panel repairs, and develop fundamental damage analysis skills. Through hands-on experience with tool identification, personal protective equipment usage, and basic repair techniques, students build the essential knowledge required for advanced coursework in collision repair. The course emphasizes understanding safety protocols, environmental regulations, and basic repair planning while introducing students to industry-standard documentation procedures. 2.D

E **Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.** 2.E

F **Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.** 2.F

KNOWLEDGE AND SKILLS 3

A **The student demonstrates the necessary skills for career development, Collision Repair and Refinishing of employability, and successful completion of course outcomes. The student is expected to:** 3.A

1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, Collision Repair and Refinishing of a clean and safe work environment, and pride in work. 3.A.1
2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn. 3.A.2
3. Employ effective reading, writing, and technical documentation skills. 3.A.3
4. Solve problems using critical thinking techniques and structured troubleshooting methodologies. 3.A.4
5. Demonstrate leadership skills and collaborate effectively as a team member. 3.A.5
6. Implement safety procedures, including proper handling of hardware and following OSHA guidelines. 3.A.6
7. Exhibit an understanding of legal and ethical responsibilities in the automotive Collision Repair and Refinishing field, following applicable laws and best practices for safety. 3.A.7
8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting. 3.A.8

B **The student identifies various career pathways in the Automotive Collision Repair and Refinishing field. The student is expected to:** 3.B

1. Develop a career plan that includes the necessary education, certifications, job skills, experience, and progression steps for specific roles as a technician or in the Automotive Collision Repair and Refinishing field. 3.B.1
2. Create a professional resume and portfolio that reflects skills, projects, certifications, and recommendations. 3.B.2

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3 Demonstrate effective interview skills for roles in the Automotive Collision Repair and Refinishing field. 3.B.3

C The student identifies the issues associated with Automotive Collision Repair and Refinishing hazards found on a jobsite. The student is expected to: 3.C

1 Demonstrate safe working procedures in a lab/shop environment. 3.C.1

2 Explain the purpose of the Occupational Safety and Health Administration (OSHA) and how it promotes safety on the job. 3.C.2

3 Identify Automotive Collision Repair and Refinishing related workplace hazards and how to avoid or minimize them. 3.C.3

4 Explain safety issues concerning lockout and tagout procedures, personal protection using assured grounding and isolation programs, automotive lift safety, and other equipment related safety protocols. 3.C.4

D The student integrates core academic skills into Automotive Collision Repair and Refinishing practices. The student is expected to: 3.D

1 Demonstrate the use of clear communication techniques, both written and verbal, that are consistent with industry standards. 3.D.1

2 Apply core mathematical skills including unit conversion between SAE and metric measurements, ratio and proportion calculations for material mixing, and basic geometric analysis of panel contours. Students apply linear measurement skills for damage assessment, utilize fractions and decimals in precise tool calibration, and employ basic algebraic formulas for initial damage estimates. The course emphasizes dimensional analysis, spatial reasoning, and quantitative measurement skills that form the basis for advanced repair calculations. 3.D.2

3 Become familiar basic materials science, focusing on the molecular structure and properties of metals, polymers, and composites used in vehicle construction. Students explore fundamental chemistry through the study of chemical bonding in primers and fillers, oxidation processes, and solvent interactions. Physics concepts include force vectors in collision dynamics, mechanical advantage principles in tool operation, and thermal expansion/contraction in metalworking. Basic electrical theory covers voltage, resistance, and grounding principles essential for tool and equipment operation. Students also examine fundamental principles of corrosion and chemical reactions in surface preparation processes. 3.D.3

E The student demonstrates understanding of workplace safety and environmental procedures. The student is expected to: 3.E

1 Analyze personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, and proper ventilation. [FS-WPS 1] 3.E.1

2 Evaluate procedures for handling and disposing of hazardous and volatile materials. [DAECS-intro] 3.E.2

3 Select and demonstrate appropriate personal protective equipment for workplace activities. [FS-WPS 1] 3.E.3

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4 Implement safety procedures for handling, storing, and disposing of chemicals according to regulations. [DAECS-intro] 3.E.4

F The student understands vehicle construction and material composition. The student is expected to: 3.F

1 Identify different types of vehicle construction (unibody, body-over-frame). [DAECS-C1-2, NS-A2] 3.F.1

2 Analyze different types and strengths of vehicle materials (steel, aluminum, plastic, composites). [DAECS-C3-4, NS-E1-2] 3.F.2

3 Explain the characteristics of various materials used in vehicle construction. [NS-E1-4, DAECS-C4] 3.F.3

4 Differentiate between structural and non-structural components. [DAECS-C1-5, SA-B1-2] 3.F.4

5 Evaluate the repairability of different materials and components. [NS-E1-2, DAECS-C4] 3.F.5

G The student performs basic panel repair procedures. The student is expected to: 3.G

1 Demonstrate proper metal straightening techniques. [NS-C1-5, CF-I1-3] 3.G.1

2 Apply appropriate body filler materials and techniques. [NS-C6-8, CF-I4-6] 3.G.2

3 Execute basic plastic repair procedures. [NS-E1-4, CF-K1-4] 3.G.3

4 Perform panel removal and installation following manufacturer specifications. [NS-B1-5, CF- H1-4] 3.G.4

5 Implement proper surface preparation techniques. [PR-B1-5, CF-E1-5] 3.G.5

H The student conducts damage analysis and estimating procedures. The student is expected to: 3.H

1 Identify types and extent of vehicle damage. [DAECS-A1-3, CF-A1-3] 3.H.1

2 Document vehicle damage using industry-standard procedures. [DAECS-A4-7, CF-A4-5] 3.H.2

3 Create basic damage repair plans. [DAECS-B1-3, CF-B1-3] 3.H.3

4 Select appropriate repair methods based on damage analysis. [DAECS-A8-10, CF-A6-7] 3.H.4

5 Apply proper documentation procedures for parts and materials. [DAECS-B4-6, CF-B4-5] 3.H.5