

Course Outline

Transportation

REVISED: August/2020

79-80-51

Auto Body Repair/1: Non-Structural

Credits: 30

Hours: 360

Course Description:

This competency-based course is the first in a sequence of five designed for the National Automotive Technicians Education Foundation (NATEF) certification in Auto Body Repair. It provides students with technical instruction and practical experience in non-structural analysis and damage repair of automobiles using sustainable and green vehicle technologies. Instruction includes classroom and workplace policies and procedures in accordance with local, state, and federal safety and environmental regulations. It covers the proper use, maintenance, and storage of auto body repair tools and equipment. Emphasis is placed on the techniques in the following areas of non-structural analysis and damage repair: preparation, outer body panel repairs/replacements/adjustments, metal finishing and body filling, movable glass and hardware, metal welding and cutting, plastics and adhesives. It also teaches trade mathematics, resource management, and employability skills. The competencies in this course are aligned with the California High School Academic Content Standards and the California Career Technical Education Model Curriculum Standards.

Prerequisites:

None.

NOTE: For Perkins purposes this course has been designated as an **introductory** course.

This course cannot be repeated once a student receives a Certificate of Completion.

Job Title

Automotive Body Technician

Career Pathway:

Structural Repair and Refinishing

Industry Sector:

Transportation

O*NET-SOC CODE:

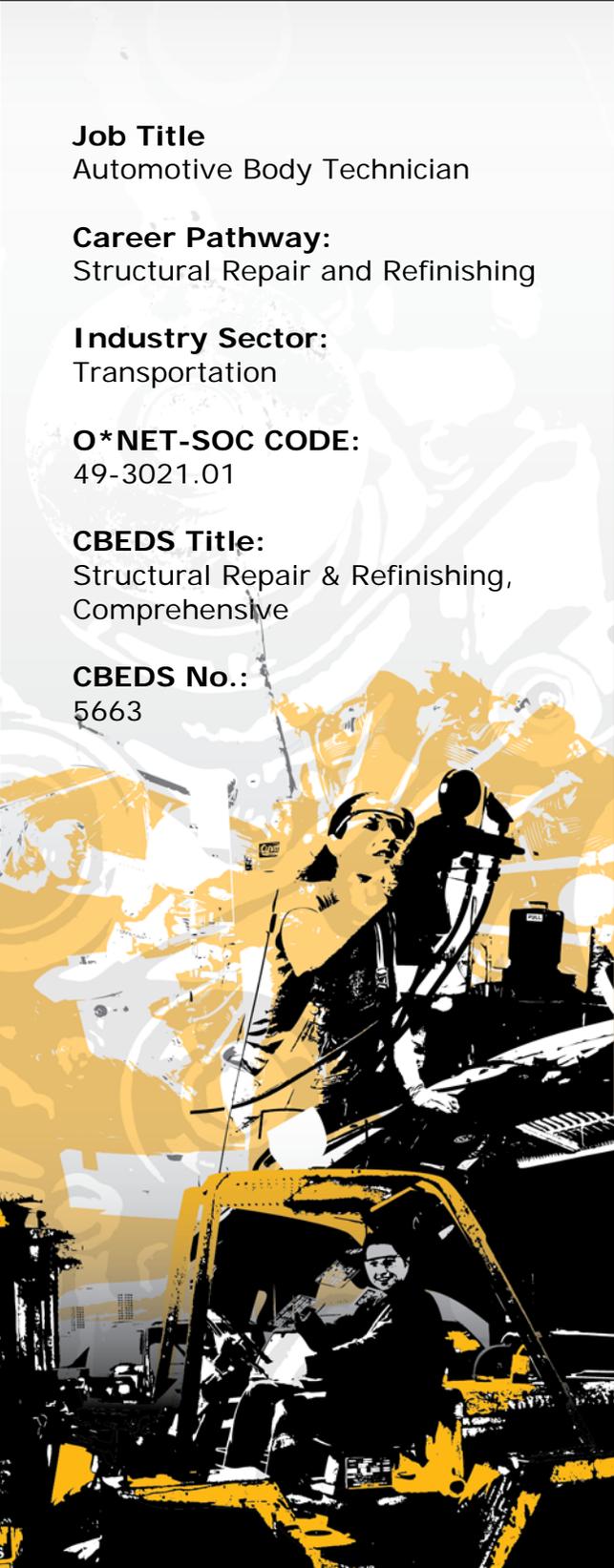
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CBEDS Title:

Structural Repair & Refinishing,
Comprehensive

CBEDS No.:

5663



COURSE OUTLINE COMPETENCY-BASED COMPONENTS

A course outline reflects the essential intent and content of the course described. Acceptable course outlines have six components. (Education Code Section 52506). Course outlines for all apportionment classes, including those in jails, state hospitals, and convalescent hospitals, contain the six required elements:

(EC 52504; 5CCR 10508 [b]; Adult Education Handbook for California [1977], Section 100)

COURSE OUTLINE COMPONENTS

LOCATION

GOALS AND PURPOSES

Cover

The educational goals or purposes of every course are clearly stated, and the class periods are devoted to instruction. The course should be broad enough in scope and should have sufficient educational worth to justify the expenditure of public funds.

The goals and purpose of a course are stated in the COURSE DESCRIPTION. Course descriptions state the major emphasis and content of a course and are written to be understandable by a prospective student.

PERFORMANCE OBJECTIVES OR COMPETENCIES

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Objectives should be delineated and described in terms of measurable results for the student and include the possible ways in which the objectives contribute to the student's acquisition of skills and competencies.

Performance Objectives are sequentially listed in the COMPETENCY-BASED COMPONENTS section of the course outline. Competency Areas are units of instruction based on related competencies. Competency Statements are competency area goals that together define the framework and purpose of a course. Competencies fall on a continuum between goals and performance objectives and denote the outcome of instruction.

Competency-based instruction tells a student before instruction what skills or knowledge they will demonstrate after instruction. Competency-based education provides instruction which enables each student to attain individual goals as measured against pre-stated standards.

Competency-based instruction provides immediate and continual repetition and in competency-based education the curriculum, instruction, and assessment share common characteristics based on clearly stated competencies. Curriculum, instruction, and assessment in competency-based education are explicit, known, agreed upon, integrated, performance oriented, and adaptive.

COURSE OUTLINE COMPETENCY-BASED COMPONENTS
(continued)

COURSE OUTLINE COMPONENTS

LOCATION

INSTRUCTIONAL STRATEGIES

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Instructional techniques or methods could include laboratory techniques, lecture method, small-group discussion, grouping plans, and other strategies used in the classroom.

Instructional strategies for this course are listed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructional strategies and activities for a course should be selected so that the overall teaching approach takes into account the instructional standards of a particular program, i.e., English as a Second Language, Programs for Adults with Disabilities.

UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT

Cover

The approximate time devoted to each instructional unit within the course, as well as the total hours for the course, is indicated. The time in class is consistent with the needs of the student, and the length of the class should be that it ensures the student will learn at an optimum level.

pp. 7-15

Units of study, with approximate hours allotted for each unit are listed in the COMPETENCY AREA STATEMENT(S) of the course outline. The total hours of the course, including work-based learning hours (community classroom and cooperative vocational education) is listed on the cover of every CBE course outline. Each Competency Area listed within a CBE outline is assigned hours of instruction per unit.

EVALUATION PROCEDURES

p. 18

The evaluation describes measurable evaluation criteria clearly within the reach of the student. The evaluation indicates anticipated improvement in performances as well as anticipated skills and competencies to be achieved.

Evaluation procedures are detailed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructors monitor students' progress on a continuing basis, assessing students on attainment of objectives identified in the course outline through a variety of formal and informal tests (applied performance procedures, observations, and simulations), paper and pencil exams, and standardized tests.

REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT

Cover

After a student has completed all the objectives of the course, he or she should not be allowed to reenroll in the course. There is, therefore, a need for a statement about the conditions for possible repetition of a course to prevent perpetuation of students in a particular program for an indefinite period of time.

ACKNOWLEDGMENTS

Thanks to PAUL PIDOUX and MARCELA BAKER for developing and editing this curriculum. Acknowledgment is also given to ERICA ROSARIO for designing the original artwork for the course covers.

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CALIFORNIA CAREER TECHNICAL EDUCATION MODEL CURRICULUM STANDARDS

Transportation Industry Sector Knowledge and Performance Anchor Standards

1.0 Academics

Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Transportation academic alignment matrix for identification of standards.

2.0 Communications

Acquire and accurately use Transportation sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management

Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology

Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Transportation sector workplace environment.

5.0 Problem Solving and Critical Thinking

Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Transportation sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques.

6.0 Health and Safety

Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Transportation sector workplace environment.

7.0 Responsibility and Flexibility

Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Transportation sector workplace environment and community settings.

8.0 Ethics and Legal Responsibilities

Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork

Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the SkillsUSA career technical student organization

10.0 Technical Knowledge and Skills

Apply essential technical knowledge and skills common to all pathways in the Transportation sector, following procedures when carrying out experiments or performing technical tasks.

11.0 Demonstration and Application

Demonstrate and apply the knowledge and skills contained in the Transportation anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through the SkillsUSA career technical student organization.

Transportation Pathway Standards

B. Structural Repair and Refinishing Pathway

The Structural Repair and Refinishing pathway prepares students for postsecondary education and employment in the transportation industry, including but not limited to body and frame straightening, estimating, painting, and refinishing (included but not limited to airplanes, trains, vehicles, and equipment).

Sample occupations associated with this pathway:

- ◆ Estimator
- ◆ Claims Adjuster
- ◆ Technician
- ◆ Insurance Company/Manufacturer's Representative
- ◆ Investigator/Inspector

B1.0 Students practice personal and occupational safety and understand the environmental effects of collision repair and refinishing practices.

B2.0 Practice the safe and appropriate use of tools, equipment, and work processes.

B3.0 Apply measurement systems and the mathematical functions necessary to perform required fabrication, maintenance, and operation procedures.

B4.0 Apply scientific principles in relation to chemical, mechanical, and physical functions and in relation to industry and manufacturer standards.

B5.0 Perform and document repair procedures in accordance with manufacturer recommendations and industry standards.

B6.0 Demonstrate basic business practices.

B7.0 Understand structural and nonstructural analysis and damage repair.

B8.0 Demonstrate an understanding of mechanical and electrical components in relation to industry and manufacturer standards.

B9.0 Demonstrate the concepts, principles, and practices of painting and refinishing.

CBE
Competency-Based Education

COMPETENCY-BASED COMPONENTS
for the Auto Body Repair/1: Non-Structural Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>A. ORIENTATION AND SAFETY</p> <p>Understand, apply, and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety and environmental regulations.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Describe the scope and purpose of the course. 2. Describe classroom policies and procedures. 3. Identify classroom and workplace first aid and emergency procedures. 4. Describe the different occupations in the Transportation Industry Sector which have an impact on the role of the auto technician. 5. Describe the importance of the “safety first” attitude. 6. Describe the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto body repair technicians. 7. Explain the impact of Environmental Protection Agency (EPA) legislation on Transportation Industry Sector practices in protecting and preserving the environment. 8. Explain the impact of California Air Resources Board (ARB) legislation on Transportation Industry Sector practices in protecting and preserving the environment. 9. Describe and demonstrate the use of the Material Safety Data Sheet (SDS) as it applies to the automotive industry. 10. Identify the safety items required by federal, state, and local regulations. 11. Describe the role of the National Automotive Technicians Education Foundation (NATEF) in auto technician training. 12. Describe and demonstrate the NATEF standards regarding proper use of protective clothing and gloves in an auto shop. 13. Describe and demonstrate the NATEF standards regarding proper use of protective respiratory gear in an auto shop. 14. Describe and demonstrate the NATEF standards regarding proper use of protective eye gear in an auto shop. 15. Describe and demonstrate the NATEF standards regarding proper ventilation in an auto shop. 16. Describe and demonstrate NATEF standards regarding proper handling, storage, and disposal of chemicals and materials used in an auto shop. 17. Describe Electrical/Hybrid Vehicle Safety 18. Pass the safety exam with 100% accuracy. 	<p>Career Ready Practice: 1, 2, 3, 8, 12</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Career Planning and Management: 3.2, 3.3, 3.4, 3.5, 3.6, 3.9 Technology: 4.1 Health and Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6 Ethics and Legal Responsibilities: 8.2 Leadership and Teamwork: 9.4 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: B1.1, B1.2, B1.3, B6.1, B6.4</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>B. TOOLS AND EQUIPMENT</p> <p>Understand, apply, and evaluate the policies and procedures for using non-structural analysis and damage repair tools and equipment in accordance with federal, state, and local safety and environment regulations.</p>	<ol style="list-style-type: none"> 1. Identify and demonstrate the proper use, maintenance, and storage techniques for the following common hand tools used in an auto body shop: <ol style="list-style-type: none"> a. adjustable wrenches b. Allen wrench sets c. chisels d. combination wrenches e. crowfoot wrench sets f. drill motors g. flare nut (tubing) wrenches h. flashlight and batteries i. hack saw and blades j. hammers k. ignition wrench set l. impact wrenches m. inspection mirror n. pickup tool o. pliers p. power reciprocating saw and blades q. punches r. screwdrivers s. Torx® sets t. screw extractor set u. screw starters v. socket sets w. torque wrenches 2. Identify and demonstrate the proper use, maintenance, and storage techniques for the following non-structural analysis and damage repair tools: <ol style="list-style-type: none"> a. abrasive cut-off tool and discs b. anchoring system c. carbon arc rod shrinking tool d. car lift (capable of totally lifting the vehicle) e. MIG welders and accessories f. plasma cutting torch g. portable hydraulic ram with attachments h. pressure washer i. plastic and adhesives tools j. portable power tools k. pulling and holding equipment set l. slide hammer m. stationary power tools n. step ladder o. structural adhesive guns (dispenser) p. vacuum cleaner q. welding safety equipment <ol style="list-style-type: none"> i. aprons ii. face shields iii. gloves 	<p>Career Ready Practice: 1, 2</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Health and Safety: 6.3, 6.6 Ethics and Legal Responsibilities: 8.5 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: B2.1, B2.2, B7.3</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(10 hours)	<ul style="list-style-type: none"> iv. goggles v. helmets vi. jackets vii. respirators viii. safety glasses ix. welding blanket x. all appropriate safety equipment r. weld-on pulling tools and attachments 	
<p>C. TRADE MATHEMATICS</p> <p>Understand, apply, and evaluate the mathematical requirements used in the workplace.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Identify the practical applications of math in auto body repair. 2. Describe and demonstrate problem-solving techniques involving whole number problems, using addition, subtraction, multiplication, and division. 3. Describe and demonstrate problem-solving techniques involving various fraction problems, using arithmetic operations (addition, subtraction, multiplication, and division). 4. Describe and demonstrate problem-solving techniques involving various decimal problems, using arithmetic operations. 5. Describe and demonstrate techniques for changing fractions to decimals. 6. Describe and demonstrate techniques for changing decimals to fractions. 7. Describe the English system of measuring length. 8. Describe the English system of measuring weight. 9. Describe the English system of measuring volume or capacity. 10. Describe the relationships between various English system linear units of measurement, such as inches, feet, yards, and miles. 11. Describe the relationships between various English system units of volume or capacity, such as cups, pints, quarts, and gallons. 12. Describe and demonstrate problem-solving techniques for various English system measuring problems, using arithmetic operations. 13. Describe and demonstrate measuring techniques of various objects by using the English system measuring tools common to the trade. 	<p>Career Ready Practice: 1, 2</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Problem Solving and Critical Thinking: 5.1, 5.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: B3.1, B 3.4</p>
<p>D. RESOURCE MANAGEMENT</p> <p>Understand, apply, and evaluate the resource management principles and techniques in the auto repair and maintenance business.</p>	<ol style="list-style-type: none"> 1. Define the following: <ul style="list-style-type: none"> a. resources b. management c. sustainability 2. Describe the management of the following resources in the auto repair and maintenance business: <ul style="list-style-type: none"> a. time b. materials c. personnel 3. List specific examples of effective management of the following in the auto repair and maintenance business: <ul style="list-style-type: none"> a. time b. materials 	<p>Career Ready Practice: 1, 3, 6, 8, 9, 12</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Career Planning and Management: 3.1, 3.2 Technology: 4.1, 4.2</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(2.5 hours)	<ul style="list-style-type: none"> c. personnel 4. Describe the benefits of effective resource management in the auto repair and maintenance business: <ul style="list-style-type: none"> a. profitability b. sustainability c. company growth 5. Describe the economic benefits and liabilities of managing resources in an environmentally responsible way. 	<p>Problem Solving and Critical Thinking: 5.1, 5.3</p> <p>Responsibility and Flexibility: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7</p> <p>Ethics and Legal Responsibilities: 8.1, 8.3, 8.4, 8.5</p> <p>Leadership and Teamwork: 9.1, 9.2, 9.3</p> <p>Technical Knowledge and Skills: 10.1, 10.2</p> <p>Demonstration and Application: 11.2</p> <p>CTE Pathway: B1.3, B1.4, B1.5, B3.2, B5.1, B5.2, B5.3, B6.1, B6.2, B6.3, B6.4</p>
<p>E. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR: PREPARATION</p> <p>Understand, apply, and evaluate damage reporting and non-structural analysis.</p>	<ul style="list-style-type: none"> 1. Read and analyze the damage report. HP-I 2. Analyze the damage to determine appropriate methods for overall repair. HP-I 3. Develop and document a repair plan. HP-I 4. Inspect, remove, store, and replace the exterior trim and moldings. HP-I 5. Inspect, remove, store, and replace the interior trim and components. HP-I 6. Inspect, remove, store, and replace the non-structural body panels and components that may interfere with or be damaged during repair. HP-I 7. Inspect, remove, store, and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair. HP-G 8. Protect panels, glass, and parts adjacent to the repair area. HP-I 9. Soap and water wash the entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired. HP-I 	<p>Career Ready Practice: 1, 12</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 Technology: 4.1, 4.2, 4.3 Problem Solving and Critical Thinking: 5.1, 5.3, 5.4 Health and Safety: 6.1, 6.3, 6.5, 6.6, 6.7 Responsibility and Flexibility: 7.2, 7.4, 7.7</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(55 hours)	10. Remove corrosion protection, undercoatings, sealers, and other protective coatings necessary to perform repairs. HP-I 11. Inspect, remove, and replace the repairable plastics and other components which are recommended for off-vehicle repair. HP-I.	Responsibility and Flexibility: 8.1 Leadership and Teamwork: 9.3 Technical Knowledge and Skills: 10.1, 10.2 CTE Pathway: B1.1, B1.2, B1.3, B2.1, B3.1, B3.2, B4.6, B5.1, B5.2, B6.1, B6.2, B6.3, B6.4, B7.2, B7.4, B7.6
F. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR: REPLACEMENTS AND ADJUSTMENTS Understand, apply, and evaluate the techniques of outer body panel repairs, replacements, and adjustments.	1. Determine the extent of direct and indirect damage. HP-I 2. Determine the direction of impact. HP-I 3. Document a repair plan. HP-I 4. Inspect, remove, and replace the bolted, bonded, and welded steel panel or panel assemblies. HP-I 5. Determine the extent of damage to aluminum body panels; repair or replace. HP-G 6. Inspect, remove, replace, and align the hood, hood hinges, and hood latch. HP-I 7. Inspect, remove, replace, and align the deck lid, lid hinges, and lid latch. HP-I 8. Inspect, remove, replace, and align the doors, tailgates, hatches, lift gates, latches, hinges, and related hardware. HP-I 9. Inspect, remove, replace, and align the bumper bars, covers, reinforcement, guards, isolators, and mounting hardware. HP-I 10. Inspect, remove, replace, and align the front fenders, headers, and other panels. HP-I 11. Straighten and rough-out the contours of the damaged panels to a suitable condition for body filling or metal finishing by using power tools, hand tools, and weld-on pull attachments. HP-I 12. Weld the damaged or torn steel body panels, repair broken welds. HP-I 13. Restore corrosion protection. HP-I 14. Replace the door skins. HP-G 15. Restore the sound deadeners and foam materials. HP-I 16. Perform panel bonding. HP-G 17. Diagnose and repair water leaks, dust leaks, and wind noise. HP-G	Career Ready Practice: 1, 12 CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 Technology: 4.1, 4.2, 4.3 Problem Solving and Critical Thinking: 5.1, 5.3, 5.4 Health and Safety: 6.1, 6.3, 6.5, 6.6, 6.7, Responsibility and Flexibility: 7.2, 7.4, 7.7 Ethics and Legal Responsibilities: 8.1 Leadership and Teamwork: 9.3 Technical Knowledge and Skills: 10.1, 10.2

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(65 hours)		CTE Pathway: B1.1, B1.4, B2.1, B3.2, B3.3, B5.2, B6.2, B6.3, B7.5, B7.6
<p>G. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR: METAL FINISHING AND BODY FILLING</p> <p>Understand and evaluate the techniques, tools, and materials of metal finishing.</p>	<ol style="list-style-type: none"> 1. Remove paint from the damaged area of a body panel. HP-I 2. Locate and reduce surface irregularities on a damaged body panel. HP-I 3. Demonstrate hammer and dolly techniques. HP-I 4. Heat shrink stretched panel areas to proper contour. HP-I 5. Cold shrink stretched panel areas to proper contour. HP-I 6. Mix body filler. HP-I 7. Apply body filler, shape during curing. HP-I 8. Rough sand cured body filler to contour; finish sand. HP-I 9. Determine the proper metal finishing techniques for aluminum. HP-G 10. Determine proper application of body filler to aluminum. HP-G 	<p>Career Ready Practice: 1, 12</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Health and Safety: 6.1, 6.3, 6.5, 6.6, 6.7 Responsibility and Flexibility: 7.4, 7.5, 7.7 Ethics and Legal Responsibilities: 8.1, 8.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: B1.3, B1.4, B1.5, B2.1, B3.2, B3.3, B4.1, B4.2, B4.5, B5.1, B6.2, B7.5, B7.6, B9.1, B9.2</p>
<p>H. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR: MOVABLE GLASS AND HARDWARE</p> <p>Understand and evaluate the diagnostic and repair techniques used for movable glass and hardware.</p>	<ol style="list-style-type: none"> 1. Inspect, adjust, repair, or replace window regulators, run channels, glass, power mechanisms, and related controls. HP-I 2. Diagnose and repair water leaks, dust leaks, and wind noises; inspect, repair, and replace weather-stripping. HP-G 3. Inspect, repair, or replace, and adjust removable, manually or power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. HP-G 4. Inspect, remove, reinstall, and align convertible top and related mechanisms. HP-G 	<p>Career Ready Practice: 1, 12</p> <p>CTE Anchor: Communications: 2.1, 2.3 Health and Safety: 6.1, 6.2, 6.4, 6.6 Responsibility and Flexibility: 7.4, 7.5, 7.7</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(35 hours)		Ethics and Legal Responsibilities: 8.1, 8.4 Technical Knowledge and Skills: 10.1 CTE Pathway: B1.4, B2.1, B3.1, B3.2, B4.5, B5.1, B5.2, B6.3, B7.2, B7.4, B7.5
I. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR: METAL WELDING AND CUTTING Understand and evaluate the techniques, tools, and material of metal welding and cutting.	<ol style="list-style-type: none"> 1. Identify weldable and non-weldable materials used in collision repair. HP-I 2. Weld and cut high-strength steel and other steels. HP-I 3. Weld and cut aluminum. HP-G 4. Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I 5. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stick out, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. HP-I 6. Store, handle, and install high-pressure gas cylinders. HP-1 7. Determine work clamp (ground) location and attach. HP-1 8. 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. HP-I 9. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-I 10. Protect computers and other electronic control modules during welding procedures. HP-I 11. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required. HP-I 12. Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I 13. Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. HP-I 14. Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet. HP-I 15. Perform visual and destructive tests on each weld type. HP-I 16. Identify the causes of various welding defects; make necessary adjustments. HP-I 17. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I 18. Identify cutting process for different materials and locations; perform cutting operation. HP-I 	Career Ready Practice: 1, 4 CTE Anchor: Communications: 2.1, 2.2, 2.3 Health and Safety: 6.1, 6.2, 6.4, 6.5, 6.6, 6.7, Ethics and Legal Responsibilities: 8.1, 8.2, 8.4 Technical Knowledge and Skills: 10.1 CTE Pathway: B1.4, B1.6, B2.1, B3.1, B3.2, B3.3, B4.1, B4.2, B4.3, B4.5, B4.6, B5.2, B6.2, B6.4, B7.3, B7.4, B7.5

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(85 hours)	19. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.). HP-G	
<p>J. NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR: PLASTICS AND ADHESIVES</p> <p>Understand, apply, and evaluate the techniques used to apply plastics and adhesives for the non-structural and damage repair of an auto body.</p> <p>(35 hours)</p>	<ol style="list-style-type: none"> 1. Identify the types of plastics; determine reparability. HP-I 2. Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts. HP-I 3. Replace or repair rigid, semi-rigid, and flexible plastic panels. HP-G 4. Remove or repair damaged areas from rigid exterior composite panels. HP-G 5. Replace bonded rigid exterior composite body panels; straighten or align panel supports. HP-G 	<p>Career Ready Practice: 1, 5</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Technology: 4.1, 4.3 Health and Safety: 6.1, 6.2, 6.4, 6.5, 6.6, 6.7, Ethics and Legal Responsibilities: 8.1, 8.2, 8.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: B1.2, B1.3, B1.4, B1.5, B2.1, B3.1, B3.2, B4.1, B4.3, B4.5, B5.1, B5.2, B6.1, B6.2, B7.4, B7.5, B9.1, B9.2</p>
<p>K. EMPLOYABILITY SKILLS</p> <p>Understand, apply, and evaluate the employability skills required in auto body repair.</p>	<ol style="list-style-type: none"> 1. Summarize employer requirements for the following: <ol style="list-style-type: none"> a. punctuality b. attendance c. attitude toward work d. quality of work e. teamwork f. responsibility g. timeliness h. communication skills i. accountability j. personal presentation 2. Identify potential employers through traditional and internet sources 3. Design sample résumés. 	<p>Career Ready Practice: 1, 2, 3, 7, 9</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4 Career Planning and Management: 3.1, 3.2, 3.3, 3.4, 3.5, 3.8, 3.9 Technology: 4.1</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(7.5 hours)	<ol style="list-style-type: none"> 4. Describe the importance of filling out a job application legibly, with accurate and complete information. 5. Complete sample job application forms correctly. 6. Describe the importance of enthusiasm on a job. 7. Describe the importance of appropriate appearance on a job. 8. Describe the importance of the continuous upgrading of job skills. 9. Describe customer service as a method of building permanent relationships between the organization and the customer. 	<p>Responsibility and Flexibility: 7.2, 7.3, 7.4, 7.5, 7.6, 7.7</p> <p>Ethics and Legal Responsibilities: 8.3, 8.4, 8.5</p> <p>Leadership and Teamwork: 9.1, 9.2, 9.3</p> <p>Technical Knowledge and Skills: 10.1, 10.2</p> <p>Demonstration and Application: 11.1, 11.2, 11.5</p> <p>CTE Pathway: B1.1, B1.4, B2.1, B4.5, B5.1, B6.2, B6.5</p>

SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES

TEXTBOOKS

Duffy, James E. Auto Body Repair Technology. Cengage Learning, 2008

Duffy, James E. Collision Repair Fundamentals. Delmar Cengage Learning, 2007.

Finch Richard. Performance Welding Handbook, 2nd Edition. Motorbooks, 2005.

LaVielle, Tom. Crash Estimating Training Guide (Where to Go When You Need to Know Motor). Hearst Business Publishing, 1999.

Parks, Dennis W. The Complete Guide to Auto Body Repair. Motorbooks, 2008.

Richardson, Jim. Pro Paint & Body. HP Trade, 2002.

Alan Livesey and Alan Robinson. Repair of Vehicle Bodies, 5th Edition. Taylor & Francis, Inc, 2006.

Sformo, Larry, Todd Sformo and George Moore. Practical Problems in Math for Automotive Technicians, 6th Edition. Cengage Learning, 2004.

RESOURCES

Employer Advisory Board members

Foundation Standards

<http://www.cde.ca.gov/ci/ct/sf/documents/transportation.pdf>

Automotive Retailing Today (ART) 8400 Westpark Dr., MS 2, McLean, VA 22102. Phone: (703) 556-8578.

Automotive Youth Educational Systems (AYES) 50 W. Big Beaver, Suite 145, Troy, MI 48084. Phone: (248) 526-1750. Fax: (248) 526-1751.

National Automobile Dealers Association (NADA) Public Relations Dept., 8400 Westpark Dr., McLean, VA 22102-3591. Phone: (703) 821-7000.

National Automotive Technicians Education Foundation (NATEF) 101 Blue Seal Dr. SE, Suite 101, Leesburg, VA 20175. Phone: (703) 669-6650. Fax: (703) 669-6125.

www.natef.org

http://www.ed-foundation.org/html_pages/products_programs_services/natef_tools/non-structural_analysis/non-structural_analysis.shtml

National Institute for Automotive Service Excellence (ASE) 101 Blue Seal Dr. SE, Suite 101, Leesburg, VA 20175. Phone: (703) 669-6600.

SkillsUSA P.O. Box 3000, Leesburg, VA 20177-0300. Phone: (703) 777-8810. Fax: (703) 777-8999.

www.skillsusa.org

COMPETENCY CHECKLIST

TEACHING STRATEGIES and EVALUATION

METHODS AND PROCEDURES

- A. Lecture and discussion
- B. Multimedia presentations
- C. Visual aids
- D. Projects
- E. Individualized Instruction

EVALUATION

SECTION A – Orientation and Safety – Pass the safety test with 100% accuracy.

SECTION B – Tools and Equipment – Pass all assignments and exams on tools and equipment with a minimum score of 80% or higher.

SECTION C – Trade Mathematics – Pass all assignments and exams on trade mathematics with a minimum score of 80% or higher.

SECTION D – Resource Management – Pass all assignments and exams on resource management with a minimum score of 80% or higher.

SECTION E – Non-Structural Analysis and Damage Repair: Preparation – Pass all assignments and exams on non-structural analysis and damage repair: preparation with a minimum score of 80% or higher.

SECTION F – Non-Structural Analysis and Damage Repair: Replacements and Adjustments – Pass all assignments and exams on non-structural analysis and damage repair: replacements and adjustments with a minimum score of 80% or higher.

SECTION G – Non-Structural Analysis and Damage Repair: Metal Finishing and Body Filling – Pass all assignments and exams on non-structural analysis and damage repair: metal finishing and body filling with a minimum score of 80% or higher.

SECTION H – Non-Structural Analysis and Damage Repair: Movable Glass and Hardware – Pass all assignments and exams on non-structural analysis and damage repair: movable glass and hardware with a minimum score of 80% or higher.

SECTION I – Non-Structural Analysis and Damage Repair: Metal Welding and Cutting – Pass all assignments and exams on non-structural analysis and damage repair: metal welding and cutting with a minimum score of 80% or higher.

SECTION J – Non-Structural Analysis and Damage Repair: Plastics and Adhesives – Pass all assignments and exams on non-structural analysis and damage repair: plastics and adhesives with a minimum score of 80% or higher.

SECTION K – Employability Skills – Pass all assignments and exams on employability skills with a minimum score of 80% or higher.

DEFINITIONS OF TECHNICAL TERMS

ACTIVE SUSPENSION SYSTEM – Electronically controlled continuously self-adjusting suspension system.

ADJUST – To bring components or equipment to specified operational settings.

ALIGN (REALIGN) – To adjust components to a line or predetermined relative position.

ANALYZE – To examine the relationship of components of an operation.

ANCHOR – To hold in place.

APPLY – To put on, attach, or affix chemicals, components or parts by spraying, brushing, spreading, or using hardware.

BLEED – To remove air from a closed system.

BUFF – To remove fine scratches, usually from a painted surface, using a fine abrasive in a neutral medium.

CHECK – To verify condition by performing an operational or comparative examination.

CLEAN – To rid component of extraneous matter for the purpose of reconditioning, repairing, measuring, or reassembling.

COLD SHRINK – To restore original contour, shape, and dimensions to stretched sheet metal areas utilizing appropriate hammer and dolly techniques.

COMPOUND – To smooth and bring out the gloss of a topcoat using an abrasive material.

CONDITION – To prepare for future action.

DENIB – To remove paint runs, sags or imperfections by sanding or filing.

DETERMINE – To establish the type and extent of damage to a component or the procedure to be used to affect the necessary repair.

DEVELOP (PLAN) – To identify, arrange or organize the steps or procedural components into a logical sequence of actions.

DIAGNOSE – To locate the root cause or nature of a problem by using the specified procedure.

EVACUATE – To remove air, fluid, or vapor from a closed system by use of a vacuum pump.

FEATHEREDGE – To taper and smooth the edges of a damaged area using abrasives.

FILL (REFILL) – To bring fluid level to specified point or volume.

FLUSH – To use a fluid to clean an internal system.

GRIND – To remove base metal using a motor-driven abrasive wheel, disk, or pad.

HEAT SHRINK – To restore original contour, shape, and dimensions to stretched sheet metal areas by applying heat and utilizing appropriate hammer and dolly techniques.

IDENTIFY – To establish the identity of a vehicle or component prior to service; to determine the nature or degree of a problem.

INSPECT – (SEE CHECK)

INSTALL (REINSTALL) – To place a component in its proper position in a system.

LEAK TEST – To locate the source of leaks in a component or system.

LOCATE – To find by using tools, measuring instruments, equipment, or the senses.

MASK – To protect a component or area from incidental damage from the application of refinishing materials or processes using tape, paper, or other appropriate materials.

MEASURE – To compare existing dimensions to specified dimensions using calibrated instruments and gauges.

MIX – To combine or blend into one mass or mixture so that the constituent parts are indistinguishable.

PERFORM – To accomplish a procedure in accordance with established methods and standards.

PROTECT – To take actions to prevent damage to areas of the vehicles adjacent to the repair area.

REDUCE – To mitigate or eliminate the effects of damage to a repair area using tools, equipment, and procedures.

REFINISH – To apply cleaners, paint, and other finishing materials to the repair areas.

REMOVE – To disconnect and separate a component from a system.

REPAIR – To restore a malfunctioning component or system to operating condition.

REPLACE – To exchange an unserviceable component with a new or rebuilt component; to reinstall a component.

RESTORE – To return the repair areas to the original size, dimensions, shape, performance characteristics, and condition.

ROUGH SAND – To remove body filler, primer/substrate, or finish materials using coarse abrasives.

SAND – To abrade with sandpaper mounted either on an orbital/rotary sander or a rubber blocking tool.

SCUFF – To abrade or otherwise apply a rough surface to a body panel or finish area using abrasives to improve adhesion.

SELECT – To choose the correct part, tool, equipment or setting during an assembly, adjustment, or procedure.

SETUP – To select and assemble components, assemblies or parts in order or combination to produce desired results.

SRS – Supplemental Restraint System.

STORE – To organize and put away parts, hardware, and components for future retrieval and use.

STRAIGHTEN – To remove bends, creases, and other damage while returning a component to its original size, shape, and condition.

STRUCTURAL COMPONENTS – Any part of a vehicle’s structure that bears loads, provides strength, and when removed would compromise the integrity of the vehicle.

TINT – To adjust the shade, color or hiding ability of paint, primer, or refinishing materials.

VERIFY – To confirm a condition, adjustment or setting.

WASH – To clean by spraying, dipping, rinsing, rubbing, or scrubbing.

WELD – To join two metals or plastic pieces together by bringing them to their melting points, often adding filler material to the joint.

Standards for Career Ready Practice

1. Apply appropriate technical skills and academic knowledge.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make connections between abstract concepts with real-world applications and recognize the value of academic preparation for solving problems, communicating with others, calculating measures, and performing other work-related practices.

2. Communicate clearly, effectively, and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, using written, verbal, electronic, and/or visual methods. They are skilled at interacting with others: they are active listeners who speak clearly and with purpose, and they are comfortable with terminology that is common to workplace environments. Career-ready individuals consider the audience for their communication and prepare accordingly to ensure the desired outcome.

3. Develop an education and career plan aligned with personal goals.

Career-ready individuals take personal ownership of their educational and career goals and manage their individual plan to attain these goals. They recognize the value of each step in the educational and experiential process, and they understand that nearly all career paths require ongoing education and experience to adapt to practices, procedures, and expectations of an ever-changing work environment. They seek counselors, mentors, and other experts to assist in the planning and execution of education and career plans.

4. Apply technology to enhance productivity.

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They understand the inherent risks—personal and organizational—of technology applications, and they take actions to prevent or mitigate these risks.

5. Utilize critical thinking to make sense of problems and persevere in solving them

Career-ready individuals recognize problems in the workplace, understand the nature of the problems, and devise effective plans to solve the problems. They thoughtfully investigate the root cause of a problem prior to introducing solutions. They carefully consider options to solve a problem and, once agreed upon, follow through to ensure the problem is resolved.

6. Practice personal health and understand financial literacy.

Career-ready individuals understand the relationship between personal health and workplace performance. They contribute to their personal well-being through a healthy diet, regular exercise, and mental health activities. Career-ready individuals also understand that financial literacy leads to a secure future that enables career success.

7. Act as a responsible citizen in the workplace and the community.

Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are aware of the impacts of their decisions on others and the environment around them, and they think about the short-term and long-term consequences of their actions. They are reliable and consistent in going beyond minimum expectations and in participating in activities that serve the greater good.

8. Model integrity, ethical leadership, and effective management.

Career-ready individuals consistently act in ways that align with personal and community-held ideals and principles. They employ ethical behaviors and actions that positively influence others. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they recognize the short-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.

9. Work productively in teams while integrating cultural and global competence.

Career-ready individuals contribute positively to every team, as both team leaders and team members. To avoid barriers to productive and positive interaction, they apply an awareness of cultural differences. They interact effectively and sensitively with all members of the team and find ways to increase the engagement and contribution of other members.

10. Demonstrate creativity and innovation.

Career-ready individuals recommend ideas that solve problems in new and different ways and contribute to the improvement of the organization. They consider unconventional ideas and suggestions by others as solutions to issues, tasks, or problems. They discern which ideas and suggestions may have the greatest value. They seek new methods, practices, and ideas from a variety of sources and apply those ideas to their own workplace practices.

11. Employ valid and reliable research strategies.

Career-ready individuals employ research practices to plan and carry out investigations, create solutions, and keep abreast of the most current findings related to workplace environments and practices. They use a reliable research process to search for new information and confirm the validity of sources when considering the use and adoption of external information or practices.

12. Understand the environmental, societal, and economic impacts of decisions.

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact other people, organizations, the workplace, and the environment. They are aware of and utilize new technologies, understandings, procedures, and materials and adhere to regulations affecting the nature of their work. They are cognizant of impacts on the social condition, environment, workplace, and profitability of the organization.

Statement for Civil Rights

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