

Course Outline

Transportation

REVISED: August/2017

Job Title:

Automotive Body Technician

Career Pathway:

Structural Repair and Refinishing

Industry Sector:

Transportation

O*NET-SOC CODE:

49-3021.00

CBEDS Title:

Structural Repair

CBEDS No.:

5664

79-80-53

Auto Body Repair/2: Structural

Credits: 30

Hours: 360

Course Description:

The competency-based course is the second 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 structural analysis and damage repair of automobiles using sustainable and green vehicle technologies. Instruction includes classroom and workplace policies and procedures in accordance with federal, state, and local 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 structural analysis and damage repair: frame inspection and repair, unibody inspection/measurement/repair, fixed glass, and metal welding and cutting. It also expands the coverage of trade mathematics, reviews resource management and employability skills, and teaches entrepreneurial 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:

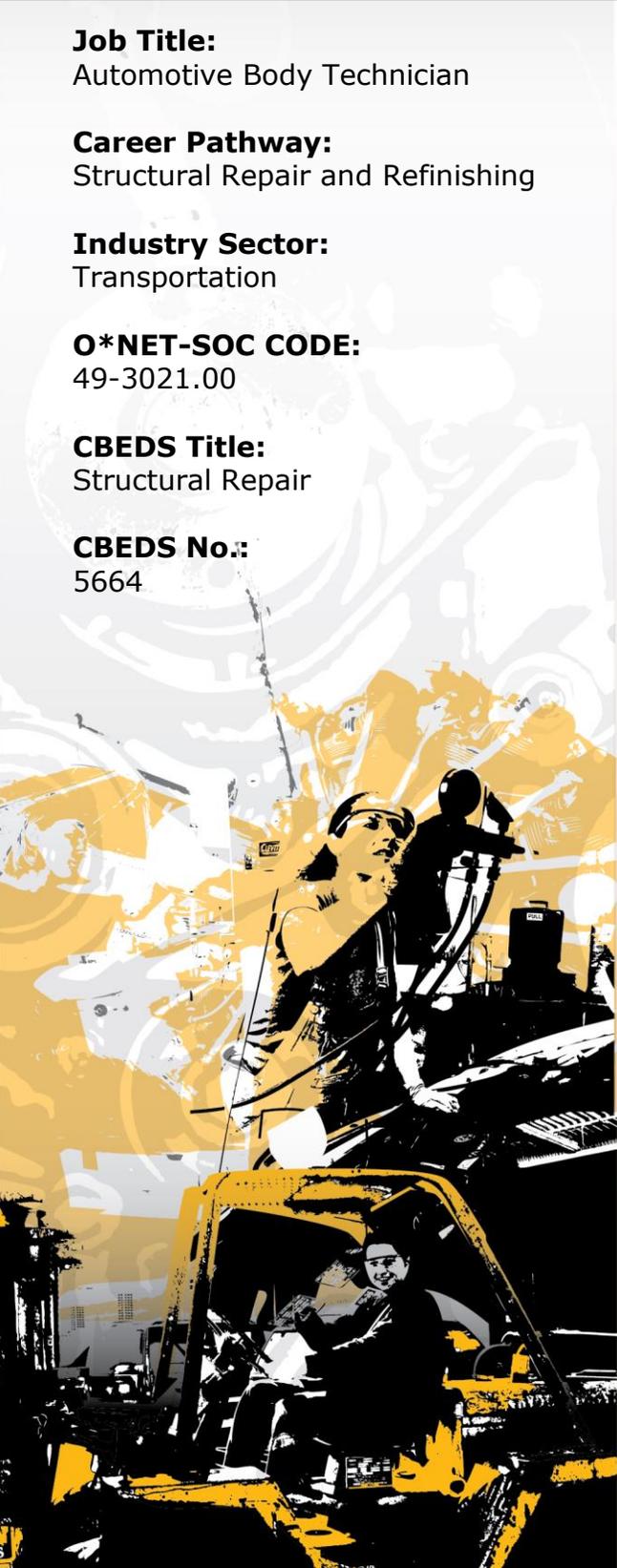
Enrollment requires the ability to lift and carry heavy items as required by the industry and successful completion of the course Auto Body Repair/1: Non-Structural (79-80-51).

NOTE: For Perkins purposes this course has been designated as a **concentrator** course.

Meets NATEF Standards and identifies high priority tasks in collision repair and refinish. Check the NATEF Manual for explanation of high priority I or G tasks.

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

Los Angeles Unified School District
Division of Adult and Career Education
Instructional and Counseling Services Unit
Adult Curriculum Office
www.weareadace.org



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

pp. 7-14

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
<p>INSTRUCTIONAL STRATEGIES</p> <p>Instructional techniques or methods could include laboratory techniques, lecture method, small-group discussion, grouping plans, and other strategies used in the classroom.</p> <p>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.</p>	p. 16
<p>UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT</p> <p>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.</p> <p>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.</p>	Cover pp. 7-14
<p>EVALUATION PROCEDURES</p> <p>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.</p> <p>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.</p>	p. 16
<p>REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT</p> <p>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.</p>	Cover

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/2: Structural Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>A. INTRODUCTION AND SAFETY</p> <p>Understand, apply, and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Review the scope and purpose of the course. 2. Review classroom policies and procedures. 3. Review classroom and workplace first aid and emergency procedures. 4. Review the different occupations in the Transportation Industry Sector which have an impact on the role of the auto technician. 5. Review the importance of the “safety first” attitude. 6. Review the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto body repair technicians. 7. Review the impact of Environmental Protection Agency (EPA) legislation on Transportation Industry Sector practices in protecting and preserving the environment. 8. Review the impact of California Air Resources Board (ARB) legislation on Transportation Industry Sector practices in protecting and preserving the environment. 9. Review and demonstrate the use of the Material Safety Data Sheet (MSDS) as it applies to the automotive industry. 10. Review the safety items required by federal, state, and local regulations. 11. Review the role of the National Automotive Technicians Education Foundation (NATEF) in auto technician training. 12. Review and demonstrate the NATEF standards regarding proper use of protective clothing and gloves in an auto shop. 13. Review and demonstrate the NATEF standards regarding proper use of protective respiratory gear in an auto shop. 14. Review and demonstrate the NATEF standards regarding proper use of protective eye gear in an auto shop. 15. Review and demonstrate the NATEF standards regarding proper ventilation in an auto shop. 16. Review and demonstrate NATEF standards regarding proper handling, storage, and disposal of chemicals and materials used in an auto shop. 17. Pass the safety exam with 100% accuracy. 	<p>Career Ready Practice: 1, 3, 6, 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>Review, apply, and evaluate the policies and procedures for using structural analysis and damage repair tools and equipment in a body shop in accordance with federal, state, and local safety and environment regulations.</p> <p>(20 hours)</p>	<ol style="list-style-type: none"> 1. Review the common hand tools used in an auto body shop. 2. Review the non-structural analysis and damage repair tools and equipment. 3. Identify and demonstrate the proper use, maintenance, and storage techniques for the following structural analysis and damage repair tools and equipment: <ol style="list-style-type: none"> a. frame/unibody straightening equipment b. body over frame and unibody anchoring systems c. self-centering gauges d. universal measuring system with minimum capability to measure 2/3rds of the total vehicle using: <ol style="list-style-type: none"> i. 4 self-centering gauges capable of asymmetrical measurement ii. 1 tram gauge iii. a strut tower measurement capability to simultaneously measure length, height, and width, <u>OR</u> incorporating a mechanical (to include strut tower gauge assembly), laser, or computerized measuring system. e. tram gauges 	<p>Career Ready Practice: 1</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Health and Safety: 6.3, 6.6 Ethics and Legal Responsibilities: 8.5</p> <p>CTE Pathway: B2.1, B2.2, B3.1, B4.3, B4.5, B7.3</p>
<p>C. TRADE MATHEMATICS REVIEW</p> <p>Review, apply, and evaluate the mathematical requirements in the workplace.</p>	<ol style="list-style-type: none"> 1. Review the practical applications of math in auto body repair. 2. Review and demonstrate problem-solving techniques involving whole number problems, using addition, subtraction, multiplication, and division. 3. Review and demonstrate problem-solving techniques involving various fraction problems, using arithmetic operations (addition, subtraction, multiplication, and division). 4. Review and demonstrate problem-solving techniques involving various decimal problems, using arithmetic operations. 5. Review and demonstrate techniques for changing fractions to decimals. 6. Review and demonstrate techniques for changing decimals to fractions. 7. Review the English system of measuring length. 8. Review the English system of measuring weight. 9. Review the English system of measuring volume or capacity. 10. Review the relationships between various English system linear units of measurement, such as inches, feet, yards, and miles. 11. Review the relationships between various English system units of volume or capacity, such as cups, pints, quarts, and gallons. 12. Review and demonstrate problem-solving techniques for various English system measuring problems, using arithmetic operations. 13. Review and demonstrate measuring techniques of various objects by using the English system measuring tools common to the trade. 14. Describe the metric system of measuring length. 15. Describe the metric system of measuring weight. 16. Describe the metric system of measuring volume or capacity. 	<p>Career Ready Practice: 1</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: B2.2, B3.1, B 3.4, B4.6</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(10 hours)	<ol style="list-style-type: none"> 17. Describe the relationships between various metric system linear units of measurement, such as millimeters, centimeters, and meters. 18. Describe the relationships between various metric system units of weight such as milligrams, grams, and kilograms. 19. Describe and demonstrate problem-solving techniques for various metric system measuring problems involving addition, subtraction, multiplication, and division. 20. Describe and demonstrate measuring techniques of objects using metric system measuring tools common to the trade. 21. Describe and demonstrate problem-solving techniques for geometric problems that apply to auto body repair. 22. Describe and demonstrate problem-solving techniques for algebraic problems that apply to auto body repair. 23. Describe and demonstrate problem-solving techniques using percentages. 24. Describe and demonstrate techniques for reading and interpreting graphs. 25. Describe and demonstrate techniques for using a calculator. 	
<p>D. RESOURCE MANAGEMENT REVIEW</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. Review the following: <ol style="list-style-type: none"> a. resources b. management c. sustainability 2. Review the management of the following resources in the auto repair and maintenance business: <ol style="list-style-type: none"> a. time b. materials c. personnel 3. Review specific examples of effective management of the following in the auto repair and maintenance business: <ol style="list-style-type: none"> a. time b. materials c. personnel 4. Review the benefits of effective resource management in the auto repair and maintenance business: <ol style="list-style-type: none"> a. profitability b. sustainability c. company growth 5. Review the economic benefits and liabilities of managing resources in an environmentally responsible way. 	<p>Career Ready Practice: 1, 3, 6, 8, 9, 12</p> <p>CTE Anchor: Communication: 2.1, 2.2, 2.3, 2.4 Career Planning and Management: 3.1, 3.2 Technology: 4.1, 4.2 Problem Solving and Critical Thinking: 5.1, 5.3 Responsibility and Flexibility: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 Ethics and Legal Responsibilities: 8.1, 8.3, 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2, 9.3 Technical Knowledge and Skills: 10.1, 10.2</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(5 hour)		Demonstration and Application: 11.2 CTE Pathway: B6.2, B6.3, B6.4
<p>E. STRUCTURAL ANALYSIS AND DAMAGE REPAIR: FRAME INSPECTION AND REPAIR</p> <p>Understand, apply, and evaluate the techniques, tools and material required for auto inspection and repair.</p> <p>(70 hours)</p>	<ol style="list-style-type: none"> 1. Diagnose and measure structural damage using tram and self-centering gauges. HP-I 2. Attach vehicle to anchoring devices. HP-I 3. Analyze, straighten and align mash (collapse) damage. HP-G 4. Analyze, straighten and align sag damage. HP-G 5. Analyze, straighten and align sideways damage. HP-G 6. Analyze, straighten and align twist damage. HP-G 7. Analyze, straighten and align diamond frame damage. HP-G 8. Remove and replace damaged structural components. HP-G 9. Restore corrosion protection to repaired or replaced frame areas. HP-I 10. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and wheel alignment problems. HP-I 11. Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and wheel alignment problems. HP-G 12. Identify heat limitations in structural components. HP-I 13. Restore structural foam. HP-G 14. Diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser). HP-G 15. Diagnose and measure structural damage to vehicles using a dedicated (fixture) measuring system. HP-G 16. Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair. HP-I 17. Analyze and identify crush/collapse zones. HP-I 	<p>Career Ready Practice: 1, 4, 5</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Technology: 4.1, 4.2 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Health and Safety: 6.2, 6.3, 6.4, 6.5, 6.6 Responsibility and Flexibility: 7.4, 7.5 Ethics and Legal Responsibilities: 8.1 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: B1.6, B2.1, B2.2, B3.1, B3.2, B3.3, B3.4, B4.1, B4.2, B4.3, B4.5, B4.6, B6.1, B7.1, B7.4, B8.2</p>
<p>F. STRUCTURAL ANALYSIS AND DAMAGE REPAIR: UNIBODY INSPECTION, MEASUREMENT, AND REPAIR</p> <p>Understand, apply, and evaluate the techniques, tools and material required for the structural analysis and damage</p>	<ol style="list-style-type: none"> 1. Analyze and identify misaligned or damaged steering, suspension, and powertrain components which can cause vibration, steering, and chassis alignment problems. HP-I 2. Realign or replace misaligned or damaged steering, suspension, and powertrain components which can cause vibration, steering and chassis alignment problems. HP-G 3. Diagnose and measure unibody damage using tram and self-centering gauges. HP-I 	<p>Career Ready Practice: 1, 4, 5</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Technology:</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>repair in unibody vehicles.</p> <p>(100 hours)</p>	<ol style="list-style-type: none"> 4. Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle. HP-G 5. Diagnose and measure unibody vehicles using a dedicated (fixture) measuring system. HP-G 6. Diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, laser). HP-G 7. Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. HP-I 8. Attach anchoring devices to vehicle; remove or reposition components as necessary. HP-I 9. Straighten and align cowl assembly. HP-G 10. Straighten and align roof rails/headers and roof panels. HP-G 11. Straighten and align hinge and lock pillars. HP-G 12. Straighten and align vehicle openings, floor pans, and rocker panels. HP-G 13. Straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points). HP-G 14. Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.). HP-G 15. Identify heat limitations in unibody vehicles. HP-I 16. Identify proper cold stress relief methods. HP-I 17. Repair damage using power tools and hand tools to restore proper contours and dimensions. HP-I 18. Remove and replace damaged sections of structural steel body panels. HP-G 19. Restore corrosion protection to repaired or replaced unibody structural areas. HP-I 20. Determine the extent of damage to aluminum structural components; repair, weld, or replace. HP-G 21. Analyze and identify crush/collapse zones. HP-I 	<p>4.1, 4.2</p> <p>Problem Solving and Critical Thinking: 5.2, 5.3, 5.4</p> <p>Health and Safety: 6.2, 6.3, 6.4, 6.5, 6.6, 6.7,</p> <p>Responsibility and Flexibility: 7.5</p> <p>Ethics and Legal Responsibilities: 8.1</p> <p>Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: B1.6, B2.1, B2.2, B3.1, B3.2, B3.3, B3.4, B4.1, B4.2, B4.3, B4.5, B4.6, B6.1, B7.1, B7.4, B8.2</p>
<p>G. STRUCTURAL ANALYSIS AND DAMAGE REPAIR: FIXED GLASS</p> <p>Understand, apply, and evaluate the techniques, tools and material required for the structural analysis and damage repair of fixed glass in a vehicle</p>	<ol style="list-style-type: none"> 1. Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials. HP-G 2. Remove and reinstall or replace modular glass using recommended materials. HP-G 	<p>Career Ready Practice: 1</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Technology: 4.1 Problem Solving and Critical Thinking: 5.2</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(35 hours)		Health and Safety: 6.2, 6.4, 6.5, 6.6 Responsibility and Flexibility: 7.4, 7.5 Technical Knowledge and Skills: 10.1 CTE Pathway: B2.1, B3.2, B7.2, B7.5
<p>H. STRUCTURAL ANALYSIS AND DAMAGE REPAIR: METAL WELDING AND CUTTING</p> <p>Understand, apply, and evaluate the techniques, tools and material required for the structural analysis and damage repair of weldable and non-weldable parts of a vehicle.</p>	<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 stickout, 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 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 11. Determine the joint type (butt weld with backing, lap, etc.) for weld being made. HP-I 12. Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. HP-I 13. Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet. HP-I 14. Perform visual and destructive tests on each weld type. HP-I 15. Identify the causes of various welding defects; make necessary adjustments. HP-I 16. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I 17. Identify cutting process for different materials and locations; perform cutting operation. HP-I 	<p>Career Ready Practice: 1, 4</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3 Technology: 4.1 Problem Solving and Critical Thinking: 5.1, 5.2 Health and Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 Responsibility and Flexibility: 7.7 Ethics and Legal Responsibilities: 8.1, 8.2 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: B1.3, B1.4, B1.5, B1.6, B2.1, B3.3, B3.4, B4.1, B4.2, B4.4, B4.5, B6.1, B7.1, B7.3, B7.4</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(100 hours)	18. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.). HP-G	
<p>I. EMPLOYABILITY SKILLS</p> <p>Understand, apply, and evaluate the employability skills required in auto body repair.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> 1. Review 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 2. Review potential employers through traditional and internet sources. 3. Update sample résumés. 4. Review the importance of filling out a job application legibly, with accurate and complete information. 5. Complete sample job application forms correctly. 6. Review the importance of enthusiasm on a job. 7. Review the importance of appropriate appearance on a job. 8. Review the importance of the continuous upgrading of job skills. 9. Review customer service as a method of building permanent relationships between the organization and the customer. 	<p>Career Ready Practice: 1, 2, 3, 7, 8</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 Responsibility and Flexibility: 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 Ethics and Legal Responsibilities: 8.3, 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2, 9.3 Technical Knowledge and Skills: 10.1, 10.2 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>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>J. ENTREPRENEURIAL SKILLS</p> <p>Understand, apply, and evaluate the process involved in becoming an entrepreneur in the auto body repair industry.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Define entrepreneurship. 2. Identify the necessary characteristics of successful entrepreneurs. 3. Describe the contributions of entrepreneurs to the auto body repair industry. 4. Explain the purpose and components of a business plan. 5. Examine personal goals prior to starting a business. 6. Evaluate sources of monetary investment in a business opportunity. 7. State various licensing requirements in the auto body repair business. 8. Develop a scenario depicting the student as the auto body repair business owner. 	<p>Career Ready Practice: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12</p> <p>CTE Anchor: Communications: 2.1, 2.2, 2.3, 2.4, 2.5 Career Planning and Management: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Technology: 4.1, 4.2 Responsibility and Flexibility: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8 Ethics and Legal Responsibilities: 8.1, 8.2, 8.3, 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2, 9.3, 9.6 Technical Knowledge and Skills: 10.1, 10.2, 10.3, 10.4 Demonstration and Application: 11.1, 11.2, 11.3, 11.4, 11.5</p> <p>CTE Pathway: B1.1, B1.5, B2.1, B3.2, B4.5, B5.1, B5.2, B6.2, B6.3, B6.4, 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 – Introduction and Safety – Pass the safety test with 100% accuracy.

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

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

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

SECTION E – Structural Analysis and Damage Repair: Frame Inspection and Repair – Pass all assignments and exams on structural analysis and damage repair: frame inspection and repair with a minimum score of 80% or higher.

SECTION F – Structural Analysis and Damage Repair: Unibody Inspection, Measurement, and Repair – Pass all assignments and exams on structural analysis and damage repair: unibody inspection, measurement, and repair with a minimum score of 80% or higher.

SECTION G – Structural Analysis and Damage Repair: Fixed Glass – Pass all assignments and exams on structural analysis and damage repair: fixed glass with a minimum score of 80% or higher.

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

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

SECTION J – Entrepreneurial Skills – Pass all assignments and exams on entrepreneurial 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 by the use of 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.

Statement for Civil Rights

All educational and vocational opportunities are offered without regard to race, color, national origin, gender, or physical disability.
