

# Course Outline

Transportation

REVISED: August/2017

**Job Title:**

Automotive Body Estimator

**Career Pathway:**

Structural Repair and Refinishing

**Industry Sector:**

Transportation

**O\*NET-SOC CODE:**

49-3021.00

**CBEDS Title:**

Structural Repair and Refinishing,  
Comprehensive

**CBEDS No.:**

5663

**79-80-59**

## Auto Body Repair/5: Estimation

**Credits:** 5

**Hours:** 90

**Course Description:**

This competency-based course is the last in a sequence of five designed for auto body repair. It provides students with technical instruction and practical experience in auto body repair estimation. Emphasis is placed on auto body construction, minor body repairs, major body repairs, painting and refinishing repairs, and collision cost estimating. It reviews classroom and workplace safety and environmental policies and procedures, trade mathematics, employability skills, and 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 in the industry and successful completion of the course Auto Body Repair/4: Painting and Refinishing (79-80-57).

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



## **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.

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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**

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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/5: Estimation Course**

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>A. INTRODUCTION AND SAFETY</p> <p>Review, apply, and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety and environmental regulations.</p> <p>(3 hours)</p>	<ol style="list-style-type: none"> <li>1. Review the scope and purpose of the course.</li> <li>2. Review classroom policies and procedures.</li> <li>3. Review the different occupations in the Transportation Industry Sector which have an impact on the role of the auto technician.</li> <li>4. Review the importance of the “safety first” attitude.</li> <li>5. Review the first aid and emergency procedures.</li> <li>6. Review the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto body repair technicians.</li> <li>7. Review the safety items required by federal, state, and local regulations.</li> <li>8. Review and demonstrate the proper use of protective clothing and gloves in an auto body shop.</li> <li>9. Review and demonstrate the proper use of protective respiratory gear in an auto body shop.</li> <li>10. Review and demonstrate the proper use of protective eye gear in an auto body shop.</li> <li>11. Review and demonstrate proper ventilation in an auto body shop.</li> <li>12. Review and demonstrate proper handling, storage, and disposal of chemicals and materials used in an auto body shop.</li> <li>13. Review and demonstrate the use of the Material Safety Data Sheet (MSDS) as it applies to the automotive industry.</li> <li>14. Pass the safety exam with 100% accuracy.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 6, 8, 12</p> <p><b>CTE Anchor:</b> 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><b>CTE Pathway:</b> B1.1, B1.2, B1.3, B6.1, B6.2, B6.3, 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 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>(3 hours)</p>	<ol style="list-style-type: none"> <li>1. Review the common hand tools used in an auto body shop.</li> <li>2. Review the tools and equipment used in the following areas of auto body repair:               <ol style="list-style-type: none"> <li>a. non-structural analysis and damage repair</li> <li>b. structural analysis and damage repair</li> <li>c. mechanical and electrical components</li> </ol> </li> </ol>	<p><b>Career Ready Practice:</b> 1</p> <p><b>CTE Anchor:</b>            Communications: 2.1, 2.2, 2.3            Ethics and Legal Responsibilities: 8.5            Technical Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b>            B2.1, B2.2</p>
<p>C. TRADE MATHEMATICS REVIEW</p> <p>Review, apply, and evaluate the mathematical requirements used in auto body estimation.</p>	<ol style="list-style-type: none"> <li>1. Review the practical applications of math in auto body repair estimation.</li> <li>2. Review and demonstrate problem-solving techniques involving whole number problems, using addition, subtraction, multiplication, and division.</li> <li>3. Review and demonstrate problem-solving techniques involving various fraction problems, using arithmetic operations (addition, subtraction, multiplication, and division).</li> <li>4. Review and demonstrate problem-solving techniques involving various decimal problems, using arithmetic operations.</li> <li>5. Review and demonstrate techniques for changing fractions to decimals.</li> <li>6. Review and demonstrate techniques for changing decimals to fractions.</li> <li>7. Review the English system of measuring length.</li> <li>8. Review the English system of measuring weight.</li> <li>9. Review the English system of measuring volume or capacity.</li> <li>10. Review the relationships between various English system linear units of measurement, such as inches, feet, yards, and miles.</li> <li>11. Review the relationships between various English system units of volume or capacity, such as cups, pints, quarts, and gallons.</li> <li>12. Review and demonstrate problem-solving techniques for various English system measuring problems, using arithmetic operations.</li> <li>13. Review and demonstrate measuring techniques of various objects by using the English system measuring tools common to the trade.</li> <li>14. Describe the metric system of measuring length.</li> <li>15. Describe the metric system of measuring weight.</li> <li>16. Describe the metric system of measuring volume or capacity.</li> <li>17. Describe the relationships between various metric system linear units of measurement, such as millimeters, centimeters, and meters.</li> </ol>	<p><b>Career Ready Practice:</b> 1</p> <p><b>CTE Anchor:</b>            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><b>CTE Pathway:</b>            B3.1, B 3.4</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(5 hours)	<ol style="list-style-type: none"> <li>18. Describe the relationships between various metric system units of weight such as milligrams, grams, and kilograms.</li> <li>19. Describe and demonstrate problem-solving techniques for various metric system measuring problems involving addition, subtraction, multiplication, and division.</li> <li>20. Describe and demonstrate measuring techniques of objects using metric system measuring tools common to the trade.</li> <li>21. Describe and demonstrate problem-solving techniques for geometric problems that apply to auto body repair.</li> <li>22. Describe and demonstrate problem-solving techniques for algebraic problems that apply to auto body repair.</li> <li>23. Describe and demonstrate problem-solving techniques using percentages.</li> <li>24. Describe and demonstrate techniques for reading and interpreting graphs.</li> <li>25. Describe and demonstrate techniques for using a calculator.</li> </ol>	
<p>D. AUTO BODY CONSTRUCTION</p> <p>Understand, apply, and evaluate trends in automotive design and differentiate between common auto body construction techniques.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> <li>1. Differentiate between auto body designs from the 1960s -1990s and those designed in the last five years.</li> <li>2. Identify two branches of government that regulate the automotive collision repair industry.</li> <li>3. Identify the following factors automotive design engineers consider in redesigning automobiles: <ol style="list-style-type: none"> <li>a. cost</li> <li>b. fuel efficiency</li> <li>c. durability</li> <li>d. maintenance</li> <li>e. aesthetics</li> </ol> </li> <li>4. Describe various reasons auto body technicians should stay abreast of new automotive design and construction trends.</li> <li>5. Differentiate between body and frame construction and unitized body construction.</li> <li>6. Describe combination frame construction.</li> <li>7. Identify various materials used in auto bodies that make automobiles lighter.</li> <li>8. Describe the need for body crowns.</li> <li>9. Define work hardening.</li> <li>10. Describe direct damage.</li> <li>11. Describe indirect damage.</li> <li>12. Differentiate between repairing and replacing a panel.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 3, 4, 5, 10</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3, 2.4 Responsibility and Flexibility: 7.1, 7.3, 7.6 Ethics and Legal Responsibilities: 8.1 Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b> B3.2, B4.1, B4.2, B4.5, B5.1, B5.2, B7.4</p>
<p>E. MINOR BODY REPAIRS</p> <p>Understand, apply, and evaluate the policies and procedures for minor body repairs used to regain the pre-</p>	<ol style="list-style-type: none"> <li>1. Describe and identify examples of the following: <ol style="list-style-type: none"> <li>a. direct damage</li> <li>b. indirect damage</li> <li>c. buffing disc marks</li> <li>d. cross cutting disc marks</li> <li>e. metal straightening</li> </ol> </li> </ol>	<p><b>Career Ready Practice:</b> 1, 3</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>accident condition of an automobile/vehicle.</p> <p>(10 hours)</p>	<p>f. metal shrinking</p> <p>2. Document a minor body repair plan by noting specific examples of the following:</p> <ul style="list-style-type: none"> <li>a. direct damage</li> <li>b. indirect damage</li> <li>c. buffing disc marks</li> <li>d. cross cutting disc marks</li> <li>e. metal straightening</li> <li>f. metal shrinking</li> </ul> <p>3. Verify details in a minor body repair plan with an auto body repair technician.</p>	<p><b>CTE Anchor:</b></p> <p>Communications: 2.1, 2.2, 2.3</p> <p>Problem Solving and Critical Thinking: 5.2</p> <p>Ethics and Legal Responsibilities: 8.1</p> <p>Technical Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b> B3.2, B4.1, B4.2, B7.4</p>
<p>F. MAJOR BODY REPAIRS</p> <p>Understand, apply, and evaluate the policies and procedures for major body repairs used to regain the pre-accident handling and performance an automobile/vehicle.</p> <p>(15 hours)</p>	<p>1. Inspect, clean, and determine the condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment). HP-I</p> <p>2. Describe and identify examples of major damages in the following:</p> <ul style="list-style-type: none"> <li>a. suspension and steering systems</li> <li>b. electrical system</li> <li>c. brake system</li> <li>d. heating and air conditioning systems</li> <li>e. cooling system</li> <li>f. drive train</li> <li>g. fuel, intake, and exhaust systems</li> <li>h. restraint systems</li> </ul> <p>3. Document a major repair plan by noting specific problems and damages on the following:</p> <ul style="list-style-type: none"> <li>a. suspension and steering systems</li> <li>b. electrical system</li> <li>c. brake system</li> <li>d. heating and air conditioning systems</li> <li>e. cooling system</li> <li>f. drive train</li> <li>g. fuel, intake, and exhaust systems</li> <li>h. restraint systems</li> <li>i. frame misalignment</li> <li>j. frame damage conditions</li> </ul> <p>4. Verify details in a major body repair plan with an auto body repair technician</p>	<p><b>Career Ready Practice:</b> 1, 3, 5</p> <p><b>CTE Anchor:</b></p> <p>Communications: 2.1, 2.2, 2.3</p> <p>Technology: 4.1, 4.2</p> <p>Problem Solving and Critical Thinking: 5.3, 5.4</p> <p>Responsibility and Flexibility: 7.2, 7.4, 7.5</p> <p>Ethics and Legal Responsibilities: 8.1</p> <p>Technical Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b> B1.1, B2.1, B3.2, B3.4, B4.1, B4.5, B5.1, B5.2, B7.4</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>G. FINISHES</p> <p>Understand, apply, and evaluate the policies and procedures for painting and finishing repairs used to regain/restore the pre-accident appearance of the vehicle.</p> <p>(15 hours)</p>	<ol style="list-style-type: none"> <li>1. Determine the type and color of paint already on vehicle by manufacturer’s vehicle information label. HP-I</li> <li>2. Define the following: <ol style="list-style-type: none"> <li>a. spot painting</li> <li>b. overall painting</li> </ol> </li> <li>3. Describe the purposes of undercoats.</li> <li>4. Identify the different types of top finishes.</li> <li>5. Describe the purposes of solvents.</li> <li>6. Describe the purposes of a clear-coated finish.</li> <li>7. Describe the purposes of catalysts.</li> <li>8. Review examples of the following paint defects: <ol style="list-style-type: none"> <li>a. blistering (raising of the paint surface)</li> <li>b. blushing (milky or hazy formation)</li> <li>c. dry-spray appearance in the paint surface</li> <li>d. presence of fish-eyes (crater-like openings) in the finish</li> <li>e. lifting</li> <li>f. clouding (mottling and streaking in metallic finishes)</li> <li>g. orange peel</li> <li>h. overspray</li> <li>i. solvent popping in freshly painted surface</li> <li>j. sags and runs in paint surface</li> <li>k. sanding marks (sandscratch swelling)</li> <li>l. contour mapping (shrinking and splitting) while finish is drying</li> <li>m. color difference (off-shade)</li> <li>n. tape tracking</li> <li>o. low gloss condition</li> <li>p. poor adhesion</li> <li>q. paint cracking (crowsfeet or line-checking, micro-checking, etc.)</li> <li>r. corrosion</li> <li>s. dirt or dust in the paint surface</li> <li>t. water spotting</li> <li>u. finish damage caused by bird droppings, tree sap, and other natural causes</li> <li>v. finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes)</li> <li>w. die-back conditions (dulling of the paint film showing haziness)</li> <li>x. chalking (oxidation)</li> <li>y. bleed-through (staining)</li> <li>z. pin-holing</li> <li>aa. buffing-related imperfections (swirl marks, wheel burns)</li> <li>bb. pigment flotation (color change through film build)</li> </ol> </li> <li>9. Describe the importance of restoring metal surfaces to original factory specifications, with seamless fit and finish.</li> <li>10. Document a finishing repair plan by noting specific finishing problems and damages.</li> <li>11. Verify details in a finishing repair plan with an auto body painter and refinisher.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 3</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3 Technology: 4.1 Problem Solving and Critical Thinking: 5.2 Health and Safety: 6.1 Responsibility and Flexibility: 7.5, 7.7 Ethics and Legal Responsibilities: 8.1 Technical Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b> B1.2, B1.3, B1.4, B1.5, B2.1, B3.2, B4.1, B4.2, B5.1, B6.1, B9.6</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>H. COLLISION COST ESTIMATION</p> <p>Understand, apply, and evaluate the policies and procedures of collision cost estimation.</p>	<ol style="list-style-type: none"> <li>1. Define the following: <ol style="list-style-type: none"> <li>a. cost</li> <li>b. labor charges</li> <li>c. retail margin</li> <li>d. insurance carrier</li> <li>e. insurance coverage</li> <li>f. insurance claims</li> <li>g. out-of-pocket pay</li> <li>h. lease turn-back</li> <li>i. appraisal</li> <li>j. estimate</li> </ol> </li> <li>2. Assess all levels of damage, from scratches to collision, by noting the following: <ol style="list-style-type: none"> <li>a. year the vehicle was made</li> <li>b. vehicle make</li> <li>c. vehicle model</li> <li>d. vehicle type</li> </ol> </li> <li>3. Document the damage by: <ol style="list-style-type: none"> <li>a. identifying the damaged area <ol style="list-style-type: none"> <li>ii. front bumper</li> <li>iii. left fender/right fender</li> <li>iv. hood</li> <li>v. left/right front door</li> <li>vi. left/right rear door</li> <li>vii. left/right quarter</li> <li>viii. trunk</li> <li>ix. rear bumper</li> <li>x. roof</li> </ol> </li> <li>b. identifying the damage level <ol style="list-style-type: none"> <li>i. slight (levels 1 and 2)</li> <li>ii. severe (levels 3 and 4)</li> </ol> </li> <li>c. writing a damage report</li> </ol> </li> <li>4. Differentiate between replacing and repairing.</li> <li>5. Differentiate between filling and straightening.</li> <li>6. Identify the following price and cost references: <ol style="list-style-type: none"> <li>a. internet</li> <li>b. collision estimating books</li> <li>c. manufacturer's flat-rate books</li> <li>d. manufacturer's parts price books</li> </ol> </li> <li>7. Determine the following using the price and cost references: <ol style="list-style-type: none"> <li>a. parts costs</li> <li>b. material cost</li> <li>c. labor charges</li> <li>d. retail margin</li> <li>e. insurance coverage and/or discounts</li> </ol> </li> </ol>	<p><b>Career Ready Practice:</b> 1, 2, 3, 4, 5, 10</p> <p><b>CTE Anchor:</b> Communications: 2.1, 2.2, 2.3, 2.4, 2.5 Technology: 4.1, 4.2 Problem Solving and Critical Thinking: 5.3 Responsibility and Flexibility: 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 Ethics and Legal Responsibilities: 8.1, 8.2, 8.3, 8.4, 8.5 Technical Knowledge and Skills: 10.1</p> <p><b>CTE Pathway:</b> B1.1, B1.3, B2.1, B3.1, B4.1, B4.5, B4.6, B5.1, B5.2, B5.3, B6.2, B6.3, B6.4, B6.5, B7.4</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(25 hours)	8. Prepare a final written estimate of the following: <ol style="list-style-type: none"> <li>minor body repair plan</li> <li>major body repair plan</li> <li>body painting and refinishing plan</li> <li>a generic repair plan</li> </ol> 9. Schedule the repair work on the auto shop calendar.	
I. EMPLOYABILITY SKILLS REVIEW  Understand, apply, and evaluate the employability skills required in auto body repair.	<ol style="list-style-type: none"> <li>Review employer requirements for the following:               <ol style="list-style-type: none"> <li>punctuality</li> <li>attendance</li> <li>attitude toward work</li> <li>quality of work</li> <li>teamwork</li> <li>responsibility</li> <li>timeliness</li> <li>communication skills</li> </ol> </li> <li>Update researched data on potential employers.</li> <li>Finalize a résumé.</li> <li>Review the importance of filling out a job application legibly, with accurate and complete information.</li> <li>Complete sample job application forms correctly.</li> <li>Review the importance of enthusiasm on a job.</li> <li>Review the importance of appropriate appearance on a job.</li> <li>Review the importance of the continuous upgrading of job skills.</li> <li>Review customer service as a method of building permanent relationships between the organization and the customer.</li> </ol>	<b>Career Ready Practice:</b> 1, 2, 3, 7, 8  <b>CTE Anchor:</b> 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  <b>CTE Pathway:</b> B1.1, B1.4, B2.1, B4.5, B5.1, B6.2, B6.5
(2 hours)		

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>J. ENTREPRENEURIAL SKILLS REVIEW</p> <p>Review, apply, and evaluate the process involved in becoming an entrepreneur in the auto body repair industry.</p> <p>(2 hours)</p>	<ol style="list-style-type: none"> <li>1. Review the definition of entrepreneurship.</li> <li>2. Review the necessary characteristics of successful entrepreneurs.</li> <li>3. Review the contributions of entrepreneurs to the auto body repair industry.</li> <li>4. Review the purpose and components of a business plan.</li> <li>5. Review personal goals prior to starting a business.</li> <li>6. Review the sources of monetary investment in a business opportunity.</li> <li>7. Review the various licensing requirements in the auto body repair business.</li> <li>8. Develop a scenario depicting the student as the auto body repair business owner.</li> </ol>	<p><b>Career Ready Practice:</b> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12</p> <p><b>CTE Anchor:</b> 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><b>CTE Pathway:</b> 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, 2<sup>nd</sup> 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, 5<sup>th</sup> Edition. Taylor & Francis, Inc, 2006.

Sformo, Larry, Todd Sformo and George Moore. Practical Problems in Math for Automotive Technicians, 6<sup>th</sup> 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.natef.org)

[http://www.ed-foundation.org/html\\_pages/products\\_programs\\_services/natef\\_tools/non-structural\\_analysis/non-structural\\_analysis.shtml](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](http://www.skillsusa.org)

## **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 with a minimum score of 80% or higher.

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

SECTION D – Auto Body Construction – Pass all assignments and exams on auto body construction with a minimum score of 80% or higher.

SECTION E – Minor Body Repairs – Pass all assignments and exams on minor body repairs with a minimum score of 80% or higher.

SECTION F – Major Body Repairs – Pass all assignments and exams on major body repairs with a minimum score of 80% or higher.

SECTION G – Finishes – Pass all assignments and exams on finishes with a minimum score of 80% or higher.

SECTION H – Collision Cost Estimation – Pass all assignments and exams on collision cost estimation 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 Review – Pass all assignments and exams on entrepreneurial skills review 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.

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### Statement for Civil Rights

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

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