Course Title: Basic Automotive Collision Repair & Refinishing

Hours: Lecture 6 Hours/Week
Lab 9 Hours/Week

Course Description: Theory and practical experience in basic automotive repair and refinishing, shop safety, personal protective equipment, with a focus on oxyacetylene welding/brazing, hand tools, air driven tools, automotive design/construction, collision repair materials, spray equipment/materials/techniques, types of undercoats, South Coast Air Quality Management District (SCAQMD) laws and regulations, introduction to Metal Inert Gas (MIG) welding, plasma arc cutting, and spot welding. This course may be used in preparation for the Automotive Service Excellence (ASE) National Test.

**Rationale:** Rewriting the course title and description to reflect the latest changes in technology.

Extra hours are needed to cover the lecture because of the complexity of today's paint systems and the increased number of Regulations of the South Coast Air Quality Management District (SCAQMD) and the Environmental Protection Agency (EPA), as well as city and county regulations.

Last updated: 3/99

SAN BERNARDINO VALLEY COLLEGE
COURSE OUTLINE

I. CATALOG DESCRIPTION:
Division: TECHNICAL Department: AUTOMOTIVE
Course ID Number: AUTO 038#3
Course Title: Basic Automotive Collision Repair & Refinishing
Hours: Lecture 6 Hours/Week
Lab 9 Hours/Week
Units: 9
Course Description: Theory and practical experience in basic automotive repair and refinishing, shop safety, personal protective equipment, with a focus on oxyacetylene welding/brazing, hand tools, air driven tools, automotive design/construction, collision repair materials, spray equipment/materials/techniques, types of undercoats, South Coast Air Quality Management District (SCAQMD) laws and regulations, introduction to Metal Inert Gas (MIG) welding, plasma arc cutting, and spot welding. This course may be used in preparation for the Automotive Service Excellence (ASE) National Test.
Prerequisite(s)/Corequisite(s): None

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: Three
Rationale for Repeatability:
A. The requirements of the Automotive Service Excellence (ASE) Certifications are continually updated and require tremendous amounts of knowledge and skills in order to pass the certification test. To remain certified, technicians must test every five years to become proficient with the changes in technology which occur every model year and often twice in a model year.
B. The South Coast Air Quality Management District (SCAQMD) Rules and Regulations are being updated continually.
C. The Occupational Safety and Health Act (OSHA) Rules and Regulations are being updated continually; for example, respirator users must be trained annually.

III. EXPECTED OUTCOMES FOR STUDENTS:
Upon completion of this course, students will be able to:
A. Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals in accordance with local, state, and federal safety and environmental regulations including, but not limited to, the regulatory departments such as the Occupational Safety and Health Act (OSHA), Bureau of Automotive Repair (BAR), South Coast Air Quality Control Board (SCAQCB), Environmental Protection Agency (EPA).

B. Apply knowledge and skills attained to pass the Automotive Service Excellence (ASE) National Test.
C. Complete National Automotive Technicians Education Foundation (NATEF) Task List:
    1. Painting and Refinishing (Test B2)
        a. Surface Preparation
            1. Remove, asses, and store trim and moldings.
            2. Featheredge areas to be refinished.
            3. Identify type of substrate and apply suitable treatment or primer.
            4. Mask trim, and protect other areas that will not be refinished.
            5. Mix primer, primer-surfacer, or sealer; spray onto surface of repaired area.
            6. Apply two-component putty to minor surface imperfections.
            7. Remove decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc.
        b. Spray Gun Operation and Related Equipment
            1. Inspect, clean, and determine condition spray guns and adequacy of related equipment (air hoses, regulator, air lines, air source, filtration unit and spray environment).
            2. Check and adjust spray gun pressure for siphon-feed, pressure-feed, gravity-feed, HVLP (high volume, low pressure) and LVLP (low volume, low pressure) guns.
            3. Adjust spray gun using fluid and pattern control valves.
            4. Select correct spray gun, needle, fluid tip, and air cap for material being sprayed.
        c. Paint Mixing, Matching, and Applying
            1. Shake, stir, reduce, catalyze, and strain refinish material according to manufacturer’s recommendations.
            2. Use appropriate spray technique (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for finish being applied.
        d. Solving Paint Application Problems
            1. Identify contaminants in the refinished surface; determine the source(s), and correct the condition.
            2. Identify a dry spray appearance in the refinished surface; determine the causes(s), and correct the condition.
            3. Identify the presence of fish-eyes (crater-like openings) in the refinished surface; determine the cause(s), and correct the condition.

4. Identify the lifting (surface distortion or shriveling) of the refinished surface; determine the cause(s), and correct the condition.
5. Identify solvent popping or pin-holing in the refinished surface; determine the cause(s), and correct the condition.

e. Finish Defects, Causes, and Cures
1. Check for rust spots (corrosion); determine the cause(s), and correct the condition.
2. Identify solvent popping or pin-holing; correct the condition.

f. Safety Precautions and Miscellaneous
1. Identify and take necessary precautions with hazardous operations and materials according to EPA regulations.
2. Identify and correct hazards to employee health and safety according to OSHA/NIOSH guidelines.
3. Inspect spray environment for health and safety hazards.
4. Select proper respiratory protection system; inspect to insure proper fit, operation, and maintenance.

2. Non-structural Analysis and Damage Repair (Test B3)

a. Preparation
1. Lift, raise, and position vehicle to perform repairs.
2. Protect panels and parts adjacent to repair area to prevent damage during repair.
3. Remove dirt, grease, wax, and other contaminants from areas to be repaired.
4. Remove pinstripes, emblems and decals (transfers/overlays, woodgrains).
5. Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
6. Identify potential safety and environmental concerns associated with vehicle components and systems, i.e. ABS, air bags (SRS), refrigerants, coolants, etc.

b. Outer Body Panel Repairs, Replacements, and Adjustments
1. Straighten contours of damaged panel to a surface condition suitable for metal finishing or body filling.

c. Metal Finishing and Body Filling
1. Remove paint from the damaged area of a body panel.
2. Prepare surface for application of body

filler material.
3. Mix plastic filler.
4. Apply plastic body filler; shape during curing.
5. Sand cured plastic body filler to contour.

e. Welding and Cutting
1. Perform test welds. Visually inspect and perform destructive test.
2. Identify safety considerations: Eye protection, proper clothing, respiratory protection, shock hazards, fumes, material safety data sheet (MSDS), etc. before beginning any welding operation.
3. Apply knowledge of the proper procedures for safely handling compressed-gas cylinders.
4. Perform the correct joint type (butt, lap, etc.) for the weld being made.
5. Determine the correct type of weld (continuous, stitch/pulse, tack, plug, spot, etc.) for each specific welding operation.
6. Identify proper cutting process for different materials and locations.

3. Structural Analysis and Damage Repair (Test B4)

a. Unibody Inspection, Measurement, and Repair
1. Remove folds, curves, creases, and dents, using power tools and hand tools, to restore damaged areas to proper contours and dimensions.
2. Determine the extent of damage to structural steel body panels; repair or replace in accordance with vehicle manufacturer’s/industry standards.

b. Metal Welding and Cutting
1. Identify safety considerations: Eye protection, proper clothing, shock hazards, fumes, etc. before beginning any welding operation.
2. Understand the proper procedures for safely handling gas cylinders.
3. Identify the proper cutting process (abrasive, mechanical, plasma arc, oxyacetylene) for different materials and locations in accordance with manufacturer’s recommendations.

4. Damage Analysis and Estimating (Test B6)

a. Damage Analysis
1. Position the vehicle for inspection.
2. Prepare vehicle for inspection by providing access to damaged areas.
3. Analyze damage to determine appropriate methods for overall repairs.
4. Determine the direction, point of impact,

and extent of direct and indirect damage.

b. Legal and Environmental Practices
   1. Recognize regulatory obligations.
   2. Recognize contractual and warranty obligations.
   3. Recognize the repairer's legal obligations to restore the vehicle to pre-loss condition based on established industry standards and vehicle manufacturer's recommendations.
   4. Apply proper business practices.

c. Vehicle Construction
   1. Identify type of vehicle construction (space frame, unibody, full-frame).
   2. Determine repairability of impact energy absorbing components.
   3. Identify steel vehicle components and repair procedures.
   4. Identify add-on accessories and modifications.

d. Vehicle Systems Knowledge
   1. Suspension, steering, and powertrain
      a. Identify major components.
      b. Identify component function.
   2. Brakes
      a. Identify major components.
      b. Identify component function.
   3. Safety systems
      a. Identify major components.
      b. Identify component function.
      c. Identify OEM component service requirements.
   4. Fasteners and materials
      a. Identify fastener type.
      b. Identify component function.
      c. Justify repair or replace decision.
      d. Recognize proper application and use of chemicals.

IV. CONTENT:

A. Introduction/Safety
   1. Industry overview/careers
   2. Shop safety, certification
   3. Fire safety
   4. Hazardous materials
   5. Personal safety
   6. Respirator program

B. Tools
   1. Hand tools
   2. Air driven tools and equipment
   3. Basic measuring equipment
   4. Tools for metalworking

C. Welding
   1. Safety equipment

2. Oxyacetylene welding/brazing
3. Metal inert gas welding
4. Types of joints
5. Fusion welding sheet metal
6. Cutting with oxyacetylene/plasma arc torch

D. Automotive Construction
1. History of automotive construction
2. Types of automotive construction
3. Identification of OEM parts
4. Vehicle identification number plates
5. Methods of attaching parts

E. Collision Repair Materials
1. Abrasives
2. Fillers
3. Adhesives
4. Solvents

F. Minor Repairs
1. Metal straightening fundamentals
2. Plastic and fiberglass repair
3. Filling dents with plastic fillers
4. Retexturing plastic surfaces

G. Refinishing Fundamentals
1. Protective equipment
2. Spray guns
3. Spray gun operation
4. Proper care of spray equipment
5. Types of undercoats
6. Air compressors
7. Spray booths
8. Hoses
9. Blowguns
10. Baking equipment

H. Laws
1. SCAQMD overview
2. Rule 109
3. Rule 1151
4. Legal and illegal products

V. METHODS OF INSTRUCTION:
The methods of instruction include but are not limited to:
A. Lecture and direct laboratory demonstration by instructor
B. Multi-media assisted instruction
C. Guided laboratory practice by the learner
D. Group participation
E. Field trips

VI. TYPICAL ASSIGNMENTS:
A. Read assigned chapters and answer questions at the end of each chapter.
Typical Question:
Write a brief narrative describing the function and service of a HVLP spray gun.
B. Set up, shut down, and use an oxy-acetylene torch.
C. Repair, fill and smooth depressed areas with auto body

plastic filler.

D. Identify potential safety and environmental concerns associated with vehicle components and systems i.e. ABS/air bags (SRS) refrigerants, etc.

E. Describe the procedure to prevent fires when performing electrical work or electrical related body repairs on an automobile.

VII. EVALUATION:

A. Methods of Evaluation:
   1. Graded assignments
   2. Graded tests
   3. Lab projects
   4. Final exam
      Typical Questions:
      a. Explain the elements of basic shop safety.
      b. Describe the safe use and maintenance of air tools.

B. Frequency of Evaluation:
   1. Twenty (20) assignments
   2. One (1) project
   3. Test at the end of each section
   4. One (1) final exam

VIII. TYPICAL TEXT(S):

Title: Principles of Auto Body Repair and Refinishing, 6th Edition
Author: Deroche & Hildebrand
Publisher: Prentice Hall
Date of Publication: 1996

Title: I-CAR Collision Repair
Author: James Duffy
Publisher: Delmar Publishers
Date of Publication: 1996

Title: Motor Auto Body Repair, Third Edition
Author: Robert Scharff/James Duffy
Publisher: Delmar Publishers
Date of Publication: 1998

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Project supplies