Course Title: Secondary Automotive Collision Repair & Refinishing

Hours: Lecture 6 Hours/week
Lab 9 Hours/week

Course Description: Theory and practical experience in automotive collision repair and refinishing, shop safety practices, personal safety and health protection, with a focus on Metal Inert Gas (MIG) welding, panel spot welding, introduction to minor uni-body/conventional frame repair, High Strength Steel (HSS) automotive body part adjustment, anti-corrosion materials, automotive hardware, servicing doors, glass, leaks, single stage paint application/problems, urethane bumper repair, introduction to front suspension design and function. Introduction to the Genesis Electronic Measuring System. 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 039#3
Course Title: Secondary Automotive Collision Repair & Refinishing
Hours: Lecture 6 Hours/week
Lab 9 Hours/week
Units: 9
Course Description: Theory and practical experience in automotive collision repair and refinishing, shop safety practices, personal safety and health protection, with a focus on Metal Inert Gas (MIG) welding, panel spot welding, introduction to minor uni-body/conventional frame repair, High Strength Steel (HSS) automotive body part adjustment, anti-corrosion materials, automotive hardware, servicing doors, glass, leaks, single stage paint application/problems, urethane bumper repair, introduction to front suspension design and function. Introduction to the Genesis Electronic Measuring System. This course may be used in preparation for the Automotive Service Excellence (ASE) National Test.
Prerequisite: AUTO 038#3
Corequisite: 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. Remove, dirt, road grime, wax or other protective coatings from area to be refinished and adjacent vehicle surfaces.
3. Inspect and identify substrate, type of finish, and surface condition; develop a plan for refinishing.
4. Remove paint finish.
5. Dry or wet sand areas to be refinished.
6. Featheredge areas to be refinished
7. Identify type of substrate and apply suitable treatment or primer.
8. Mask trim, and protect other areas that will not be refinished.
9. Mix primer, primer-surfacer, or sealer; spray onto surface of repaired area.
10. Apply two-component putty to minor surface imperfections.
11. Dry or wet sand area to which primer-surfacer and/or two-component putty have been applied.
12. Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
13. Clean area to be refinished using a proper cleaning solution.
14. Remove, with a tack rag, any dust or lint particles from the area to be refinished.
15. Apply suitable sealer to the area being refinished when sealing is needed or desirable.
16. Remove imperfections from sealer.
17. Apply stone chip-resistant coating.
18. Restore corrosion resistant coatings, caulking, and seam sealers to repaired areas.
19. 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.
5. Force-dry refinishing materials.

c. Paint Mixing, Matching, and Applying
1. Determine type and color finish already on vehicle.
2. Identify paint color formula and proper usage of mixing equipment and materials.
3. Shake, stir, reduce, catalyze, and strain refinish material according to manufacturer’s recommendations.
4. Use appropriate spray technique (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for finish being applied.
5. Apply selected product on test panel or let-down panel in accordance with vehicle/refinishing manufacturer’s recommendations.
6. Apply single stage topcoat for spot and panel refinishing, and overall refinishing.
7. Apply basecoat for spot and panel blending, and overall refinishing.
8. Apply clearcoat.
9. Identify the types of rigid, or flexible plastic parts to be refinished; determine the proper materials and refinishing procedures.
10. Refinish rigid, soft, or flexible plastic parts.

d. Solving Paint Application Problems
1. Identify blistering (raising of the refinished surface); determine the cause(s), and correct the condition.
2. Identify contaminants in the refinished surface; determine the source(s), and correct the condition.
3. Identify contaminants in the refinished surface; determine the source(s), and correct the condition.
4. Identify a dry spray appearance in the refinished surface; determine the causes(s), and correct the condition.
5. Identify the presence of fish-eyes

(crater-like openings) in the refinished surface; determine the cause(s), and correct the condition.

6. Identify the lifting (surface distortion or shriveling) of the refinished surface; determine the cause(s), and correct the condition.
7. Identify mottling or streaking in metallic and mica paint finishes; determine the cause(s), and correct the condition.
8. Identify excessive texture (orange peel) appearance of the refinished surface; determine the causes(s), and correct the condition.
9. Identify an overspray condition; determine the cause(s), and correct the condition.
10. Identify solvent popping or pin-holing in the refinished surface; determine the cause(s), and correct the condition.
11. Identify sags and runs in the refinished surface; determine the causes(s), and correct the condition.
12. Identify sandscratch swelling in the refinished surface; determine the cause(s), and correct the condition.
13. Identify shrinking or splitting while the finish is curing; determine the cause(s), and correct the condition.
14. Identify color mismatch; determine the cause(s), and correct the condition.
15. Identify tape tracking; determine the cause(s), and correct the condition.
16. Identify loss of gloss in the refinished surface; determine the cause(s), and correct the condition.

e. Finish Defects, Causes, and Cures

1. Identify poor adhesion; determine the cause(s), and correct the condition.
2. Identify finish cracking (crowsfeet or line-checking, micro-checking, etc.); determine the cause(s), and correct the condition.
3. Check for rust spots (corrosion); determine the cause(s), and correct the condition.
4. Identify blistering in the finish surface; determine the cause(s), and correct the condition.
5. Identify water spotting on finish surface; correct the condition.
6. Identify finish damage causes by bird droppings, tree sap, and other natural

causes; correct the condition.
7. Identify finish damage caused by airborne contaminants, (acids, soot, rail dust, and other industrial-related causes); correct the condition.
8. Identify die-back conditions (dulling of the paint film showing haziness, or film distortion showing shrinking); correct the condition.
9. Identify chalking (oxidation); correct the condition.
10. Identify body filler bleed-through or staining; correct the condition.
11. Identify solvent popping or pin-holing; correct the condition.
12. Identify damage caused by buffing painted surfaces; correct the condition.
13. Identify film defect from too much or too little film build; measure finish film thickness.

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.
5. Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc.

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

a. Preparation
1. Review damage report; analyze damage to determine appropriate methods for overall repair.
2. Lift, raise, and position vehicle to perform repairs.
3. Remove outside trim and moldings as necessary; store reusable parts.
4. Remove damaged or undamaged inside trim and moldings as necessary; store reusable parts.
5. Remove undamaged, non-structural body panels and components that may interfere with or be damaged during repair.
6. Remove all vehicle mechanical and electrical components that may interfere with or be damaged during repair.

7. Protect panels and parts adjacent to repair area to prevent damage during repair.
8. Remove dirt, grease, wax, and other contaminants from areas to be repaired.
9. Remove pinstripes, emblems and decals (transfers/overlays, woodgrains).
10. Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
11. Remove repairable plastics and other parts that are recommended for off-vehicle repair.
12. Identify potential safety and environmental concerns associated with vehicle components and systems, i.e. ABS, air bags (SRS), refrigerants, coolants, etc.
13. Determine repair procedures in accordance with the vehicle manufacturer's specifications and industry procedures.

b. Outer Body Panel Repairs, Replacements, and Adjustments
1. Determine the extent of the direct and indirect damage and the direction of impact; plan the methods and order of repair.
2. Remove and replace bolted, bonded, and welded panels or panel assemblies.
3. Remove, replace, and align hood, hood hinges, and hood latch/lock.
4. Remove, replace, and align deck lid, lid hinges, and lid latch/lock.
5. Remove and replace doors, tailgates, hatches, lift gates, latch/lock assemblies, and hinges.
6. Remove, replace, and align bumpers, reinforcements, guards, absorbers, isolators, and mounting hardware.
7. Check and adjust clearances of front fenders, header, and other panels.
8. Check door hinge condition and alignment, adjust or replace as necessary, and adjust door clearances.
9. Straighten contours of damaged panel to a surface condition suitable for metal finishing or body filling.
10. Weld cracked or torn metal body panels; reweld damaged welds; replace molding studs.
11. Apply protective coatings and sealants to restore corrosion protection.
12. Remove damaged sections of metal body

panels; weld in replacements.
13. Repair door frame, repair or replace door skins; inspect intrusion beams.
14. Restore sealers, mastic, sound deadeners, and foam fillers.
15. Diagnose and repair water leaks, dust leaks, wind noise, squeaks, and rattles.
16. Install interior and exterior trim and moldings.

c. Metal Finishing and Body Filling
1. Remove paint from the damaged area of a body panel.
2. Metal finish the damaged area of a body panel to eliminate surface irregularities.
3. Heat shrink stretched panel areas to proper contour.
4. Cold shrink stretched panel areas to proper contour.
5. Heat shrink stretched panel areas to proper contour.
6. Cold shrink stretched panel areas to proper contour.

d. Glass and Hardware
1. Inspect, adjust, or replace moveable, electrically-heated, stationary, mechanically-fastened, and hinged glass.
2. Inspect, adjust, repair, or replace window regulators, run channels, power mechanisms, and related controls.
3. Inspect, repair or replace, and adjust removable, manually-operated glass roof panels and hardware.
4. Diagnose and repair water leaks, dust leaks, and noises; inspect, repair, or replace weather-stripping.

e. Welding and Cutting
1. Identify weldable and non-weldable materials used in vehicle construction.
2. Understand the limitations of welding and cutting high-strength steels and other metals.
3. Determine correct welding process [GMAW (MIG), compression/resistance spot, GTAW (TIG)], electrode, wire type, diameter, and gas to be used in specific welding situations.
4. Adjust the welding equipment for proper operation.
5. Perform test welds. Visually inspect and perform destructive test.
6. Identify safety considerations: Eye protection, proper clothing, respiratory protection, shock hazards, fumes,

material safety data sheet (MSDS), etc. before beginning any welding operation.
7. Insure proper work clamp (ground) location.
8. Use the proper gun-to-joint angle, and direction of gun travel, for welds being made in all positions.
9. Protect vehicle components, including computers and other electronic modules, from possible damage caused by welding and cutting.
10. Clean the metal to be welded; assure good metal fit-up; apply corrosion protection.
11. Perform the correct joint type (butt, lap, etc.) for the weld being made.
12. Determine the correct type of weld (continuous, stitch/pulse, tack, plug, spot, etc.) for each specific welding operation.
13. Identify the causes of weld defects; make necessary adjustment.
14. Identify proper cutting process for different materials and locations.

f. Plastic Repair
1. Repair plastic parts by welding or using repair materials (adhesives, reinforcing materials).
2. Retexture plastic parts.
3. Repair vinyl-clad urethane foam parts.
4. Reshape and shrink flexible exterior plastic parts.

3. Structural Analysis and Damage Repair (Test B4)

a. Frame Inspection and Repair
1. Diagnose structural damage using tram, self-centering gauges, or three-dimensional measuring systems (mechanical, electronic/computerized, laser) in accordance with industry specifications.
2. Repair or replace damaged frame horns, side rails, cross members, frame brackets, supplemental restraint system (SRS) mounts, and front or rear sections in accordance with vehicle manufacturer’s/industry standards.

b. Unibody Inspection, Measurement, and Repair
1. Determine the extent of direct and indirect damage, and the direction of impact; plan the methods and sequence of repair.
2. Straighten and align rear section. (Quarter panels, rear compartment opening, wheelhouse assemblies, rear body panel, rails, suspension, and powertrain

mounting points).

3. Recognize the limitations of applying heat to high-strength steel (HSS) structural components.
4. Use cold stress relief methods.
5. Remove folds, curves, creases, and dents, using power tools and hand tools, to restore damaged areas to proper contours and dimensions.
6. Determine the extent of damage to structural steel body panels; repair or replace in accordance with vehicle manufacturer's/industry standards.
7. Restore corrosion protection to repaired or replaced unibody structural areas.

c. Stationary Glass
   1. Remove and replace front and rear stationary glass (heated and non-heated) in accordance with manufacturer's recommendations.
   2. Remove and replace side modular glass in accordance with manufacturer's recommendations.
   3. Determine when and how to use the partial cutout or the full cutout method of repair when replacing a windshield.

d. Metal Welding and Cutting
   1. Identify weldable and non-weldable materials and components used in vehicle construction.
   2. Understand the limitations of welding and cutting high-strength steels (HSS) and aluminum.
   3. Determine correct welding process [GMAW (MIG), compression/resistance spot, GTAW (TIG)], electrode, wire type, diameter, and gas to be used in specific welding situations.
   4. "Tune" the MIG welder by adjusting for proper electrode stickout, voltage, polarity, flow rate, and wire speed required for the material being welded.
   5. Identify safety considerations: Eye protection, proper clothing, shock hazards, fumes, etc. before beginning any welding operation.
   6. Understand the proper procedures for safely handling gas cylinders.
   7. Ensure proper work clamp (ground) location.
   8. Use the proper gun-to-joint angle, and the direction of gun travel, for welds being made in all positions.
   9. Protect vehicle components, including

computers and other electronic modules, from possible damage from welding and cutting operations.

10. Clean the metal to be welded; assure good metal fit-up; apply weld-through primer.
11. Identify the type of weld joint (butt, lap, etc.) for the repair being made.
12. Determine the correct type of weld (continuous, stitch/pulse, tack, plug, spot, etc.) and preparation for each specific welding operation.
13. Identify the causes of welding defects (spits and sputters, burn through, lack of penetration, cracks in metal, porosity, incomplete fusion, excessive spatter, distortion, waviness of bead, and failure of wire to feed); make necessary adjustments.
14. Identify the proper cutting process (abrasive, mechanical, plasma arc, oxyacetylene) for different materials and locations in accordance with manufacturer's recommendations.
15. Remove damaged high-strength (HSS) components and weld in replacements in accordance with vehicles manufacturer's recommended procedures.
16. Remove damaged structural steel components, and weld in replacements in accordance with vehicle manufacturers recommended procedures.

4. Mechanical and Electrical Components (Test B5)
   a. Suspension and Steering
      1. Identify suspension system fasteners which should not be reused.
      2. Remove and replace power steering pump; belts, hoses, and fittings; inspect pump mounts.
      3. Remove and replace power steering gear (non-rack and pinion type).
      4. Remove and replace power rack and pinion steering gear; inspect and replace mounting bushings and brackets; ensure proper mounting location.
      5. Inspect and replace pitman arm.
      6. Inspect and replace relay (center link/intermediate) rod.
      7. Inspect rear axle assembly for damage and misalignment.
      8. Inspect and replace shock absorbers, air shock absorbers, load-leveling devices, air springs, and associated lines and fittings.
      9. Diagnose, inspect, adjust, repair, or

replace components of electronically controlled suspension systems.

10. Measure vehicle ride height; determine needed repairs.
11. Diagnose steering column damage, looseness, and binding problems (including tilt mechanisms); determine needed repairs.
12. Diagnose manual and power steering gear (non-rack and pinion type) noises, binding, uneven turning effort, looseness, hard steering and lubricant leakage problems; determine needed repairs.
13. Diagnose manual and power rack and pinion steering gear noises, vibration, looseness, and hard steering problems; ensure proper mounting location.
14. Diagnose front and rear suspension system noises and body sway problems determine needed repairs.
15. Check and adjust front and rear wheel camber on suspension systems with camber adjustments.
16. Check front and rear wheel camber on non-adjustable suspension system; determine needed repairs.
17. Check and adjust caster on suspension systems with caster adjustments.
18. Check caster on non-adjustable suspension systems; determine needed repairs.
19. Check and adjust front wheel toe; center steering wheel if necessary.
20. Identify toe-out-turns (turning radius) related problems; determine needed repairs.
21. Identify SAI (steering axis inclination)/KPI (king pin inclination) related problems; determine needed repairs.
22. Check rear wheel toe; determine needed repairs.
23. Identify thrust angle related problems; determine needed repairs.
24. Check for front wheel setback; determine needed repairs.
25. Diagnose tire wear patterns; check and adjust air pressure.
26. Diagnose wheel/tire vibration, shimmy, and tramp (wheel hop) problems; determine needed repairs.
27. Measure wheel, tire, axle, and hub runout; determine needed repairs.
28. Diagnose tire pull (lead) problems;

determine corrective actions.

29. Check wheels for dents, cracks, mounting surface damage, and worn lug holes.

b. Electrical

1. Remove and replace alternator, alternator drive belts, pulleys, and fans; inspect and adjust alignment.
2. Remove and replace headlights, parking/taillights, stoplights, flashers, turn signals and backup lights; check operation; aim headlights as necessary.
3. Check operation of retractable headlight assembly.
4. Remove and replace motors, switches, relays, connectors, and wires of retractable headlight assembly circuits.
5. Remove and replace horn(s); check operation.
6. Check operation of windshield wiper/washer system.
7. Check operation of power side windows and power tail-gate window.
8. Remove and replace components of electric door and hatch/trunk lock; check operation.
9. Remove and replace components of power antenna circuits; check operation.

c. Brakes

1. Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports; replace brake lines (double flare and ISO types), hoses, fittings, and supports.
2. Inspect flexible brake hoses for leaks, kinks, cracks, bulging, or wear; remove and replace hoses; tighten loose fittings and supports.
3. Select, handle, store, and install brake fluids (including silicone fluids).
4. Bleed (manual, pressure, vacuum, or surge) and/or flush hydraulic brake system in accordance with manufacturers' procedures.
5. Reinstall wheels and torque lug nuts; make final checks and adjustments.
6. Clean and inspect caliper mountings and slides for wear and damage.
7. Check parking brake system operation.

d. Engine Cooling Systems

1. Inspect and replace engine cooling and heater system hoses and belts.
2. Inspect, remove, and replace radiator, pressure cap, coolant recovery system,

and water pump.

3. Remove and replace thermostat, by-pass, and housing.
4. Recover, flush, and refill bleed system with proper coolant and level of protection; leak test system.
5. Remove and replace fan, fan pulley (both electrical and mechanical), and fan shroud.
6. Inspect, remove, and replace auxiliary oil coolers.
7. Inspect, remove, and replace electric fan sensors and wiring.

e. Drive Train
   1. Remove and replace powertrain assembly; inspect, replace, and align powertrain mounts.
   2. Remove, replace, and adjust cables or linkages for throttle valve (TV), kickdown, and accelerator pedal.
   3. Remove and replace electronic sensors, wires, and connectors.
   4. Remove, replace and adjust mechanical or hydraulic shift or clutch linkage as required.
   5. Remove and replace front and/or rear drive axle assembly.
   6. Remove, inspect, and replace front-drive shafts and axle constant velocity (CV) joints.
   7. Inspect, remove, and replace front and rear drive shafts and universal joints.

f. Fuel, Intake and Exhaust Systems
   1. Inspect, remove, and replace exhaust manifold, exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields.
   2. Inspect, remove, and replace fuel tank, fuel tank filter, fuel cap, fuel filler hose, quarter-to-body seal, and inertia switch; inspect and replace fuel lines and hoses; check fuel for contaminants.
   3. Inspect, remove, and replace engine components of air intake systems for collision damage.
   4. Inspect, remove, and replace canister, filter, vent, and purge lines of fuel vapor control systems.

g. Restraint Systems
   1. Active restraint systems
      a. Inspect, remove, and replace seatbelt and shoulder harness assembly and components in accordance with manufacturers’

recommendations.
b. Inspect restraint system mounting areas for damage; repair in accordance with manufacturer' recommendations.
c. Verify proper operation of seatbelt in accordance with manufacturers' recommendations.

2. Passive restraint systems
a. Remove and replace seatbelt and shoulder harness assembly and components in accordance with manufacturers' recommendations.
b. Inspect restraint system mounting areas for damage; repair as necessary.
c. Verify proper operation of seatbelt in accordance with manufacturers' recommendations.
d. Remove, inspect, and replace track and drive assembly, lap retractor, torso retractor, inboard buckle lap retractor, and knee bolster (blocker) in accordance with manufacturers' recommendations.

3. Supplemental Restraint Systems (SRS)
a. Disarm airbag system in accordance with manufacturers' procedures.
b. Inspect and replace sensors and wiring in accordance with manufacturers' procedures; insure proper sensor orientation.
c. Inspect, replace, and dispose of deployed airbag modules in accordance with manufacturers' procedures.
d. Verify that system is armed and operational in accordance with manufacturers' procedures.
e. Inspect, remove, replace, and dispose of non-deployed airbag in accordance with manufacturers' procedures.
f. Use fault codes to diagnose and repair airbag system.

5. 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.

5. Identify and record pre-existing damage.
6. Perform visual inspection of structural components and members; determine if repair ore replacement is required.
7. Identify structural damage using measuring tools and equipment.
8. Perform visual inspection of non-structural components and members; determine if repair or replacement is required.
9. Determine parts and components necessary for proper repair.
10. Identify type and condition of finish; determine if refinishing is required.
11. Identify suspension, electrical, and mechanical component damage.
12. Identify safety systems damage and related service requirements.
13. Identify interior component damage.
14. Identify damage to add-on accessories and modifications.

b. Estimating
1. Identify vehicle identification number (VIN), make, model, year, production date, body style, trim level, paint code, engine, transmissions, mileage, and license plate information.
2. Identify options, condition, accessories, modifications, and safety systems.
3. Apply appropriate estimating nomenclature (terminology).
4. Apply appropriate parts nomenclature (terminology).
5. Determine and apply appropriate estimating sequence.
6. Utilize estimating guide procedure pages.
7. Apply estimating guide footnotes and headnotes as needed.
8. Estimate labor value for operation requiring judgement.
9. Select correct labor value for vehicle year, make, model body style, and options for each operation.
10. Select and price OEM parts.
11. Select and price non-OEM parts; verify availability.
12. Select and price salvage (used) parts; verify availability and condition.
13. Select and price remanufactured, rebuilt and reconditioned parts; verify availability.
14. Determine price and source of necessary sublet operations.
15. Determine labor value, prices, charges,

allowances, or fees for non-included operation and miscellaneous items.

16. Recognize and apply overlap deduction, included operations, and additions.
17. Determine additional material and charges.
18. Determine refinishing material charges.
19. Select correct refinish labor value, remove overlap, and apply additions.
20. Determine sectioning procedures where appropriate and establish labor values.
21. Identify repair process for structural areas and establish labor values.
22. Apply math skills to establish charges and totals.
23. Identify procedural differences between major computer assisted and manually written estimating systems.
24. Identify procedures to establish corrosion protection and establish labor values.
25. Determine appropriate application of betterment/depreciation to parts and allowances as necessary.

c. 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.
d. Vehicle Construction
    1. Determine repairability of impact energy absorbing components.
    2. Identify steel vehicle components and repair procedures.
    3. Identify plastic components and repair procedures.
    4. Identify vehicle glass components and repair procedures.
    5. Identify add-on accessories and modifications.
e. Vehicle Systems Knowledge
    1. Suspension, steering, and powertrain
        a. Identify OEM component service requirements.
    2. Brakes
        a. Identify OEM component service requirements.
    3. Electrical/electronic systems
        a. Identify major components.

b. Identify component function.
c. Identify OEM component service requirements.

f. Parts Identification and Source
   1. New aftermarket
      a. Identify components.
      b. Identify component function.
      c. Justify repair or replace decision.
      d. Recognize proper application and use of chemicals.
   2. Salvage
      a. Identify components.
      b. Identify component function.
      c. Justify repair or replace decision.
      d. Recognize proper application and use of chemicals.
   3. Remanufactured/rebuilt/reconditioned
      a. Identify components.
      b. Identify component function.
      c. Justify repair or replace decision.
      d. Recognize proper application and use of chemicals.

g. Customer Relations and Sales Skills
   1. Acknowledge and greet customer/client.
   2. Listen to customer/client; collect information and identify customer’s/client’s concerns and needs.
   3. Establish cooperative attitude with customer/client.
   4. Identify yourself to telephone customer/client; offer assistance.
   5. Use salutation skills (post greeting).
   6. Deal with angry customer/client.
   7. Know the internal communication network and department policies.
   8. Follow up; keep customer/client informed of status of request.
   9. Recognize basic claims handling procedures; explain to customer/client.
   10. Project positive attitude and professional appearance.
   11. Inform customer/client about parts and the repair process.
   12. Provide warranty information.
   13. Provide technical and consumer protection information.
   14. Estimate and explain duration of out-of-service time.
   15. Provide service feature information.
   16. Apply negotiation skills and obtain a mutual agreement.
   17. Interpret and explain manual or computer-assisted estimate to customer/client.

IV. CONTENT:

A. Introduction/Safety
   1. Personal safety and health protection
   2. Safe use and care of tools
   3. Respirator program

B. Welding
   1. Welding safety
   2. Welding, heating, and cutting
   3. Types of joints
   4. Preventative maintenance

C. Minor Repairs
   1. Metal straightening fundamentals
   2. Plastic and fiberglass repair
   3. Replacing, hoods, bumpers, fenders
   4. Repair sheet metal damage using a stud gun

D. Major Repairs
   1. Principles of frame alignment and straightening
   2. Measuring vehicle damage
   3. Types of body/frame misalignment
   4. Basic frame/uni-body straightening

E. Repairing Sheet Metal Panels
   1. Methods of strengthening sheet metal
   2. Types of steel
   3. Relieving stress
   4. Expansion and contraction of metal
   5. Shrinking

F. Restoring Corrosion Protection
   1. What is corrosion?
   2. Causes for the loss of factory protection
   3. Anti-corrosion materials
   4. Anti-corrosion application
   5. Acid rain damage

G. Making Adjustments
   1. Hoods and fenders
   2. Doors
   3. Trunk lids and hatchbacks
   4. Bumpers
   5. Headlights

H. Servicing
   1. Doors and glass
   2. Weather strip maintenance
   3. Body sealing

I. Pre-painting Preparation
   1. Vehicle preparation
   2. Shop and equipment preparation
   3. Identifying paint codes
   4. Types of spray booths

J. Single Stage Refinishing
   1. Painting fundamentals
   2. Paint problems
   3. Techniques
   4. Applying the paint film

K. Automotive Plastics/Repair
   1. Types of plastics

2. Automotive plastic symbols/chemical name
3. Automotive plastic trade name and application
4. Types of repairs and methods

L. Suspension Systems-Fundamentals
1. Front end geometry
2. Front end geometry angles
3. Steering Axis Inclination (SAI)
4. Caster/camber
5. Toe/turning radius
6. Rear wheel/front wheel drive vehicles

M. Electronic Measuring System-Fundamentals
1. Components and terminology
2. Windows fundamentals
3. Basic measuring procedures
4. Maintenance and service

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

VI. TYPICAL ASSIGNMENTS:
A. Read assigned chapters and answer questions at the end of each chapter.
Typical Question:
What are some of the advantages of MIG welding over other types of welding?
B. Weld, plug weld and spot-weld assorted sizes and thickness of Automotive sheet metal with GMAW (MIG) welding equipment.
C. Calculate VOC (Volatile Organic Compounds) for single stage and two stage paint systems.
D. Align doors, fenders, and hood in the proper sequence.

VII. EVALUATION:
A. Methods of Evaluation:
1. Graded assignments
2. Graded tests
3. Major lab project
4. Final exam
Typical Questions:
a. Explain the method used to build a ground-out metal area back to the paint film surface.
b. What safety precautions should be taken when using a plasma arc torch?

B. Frequency of Evaluation:
1. Twenty-five (25) assignments
2. One (1) project
3. Test at the end of each section
4. One (1) final exam

VIII. TYPICAL TEXT(S):

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

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

Title: Motor Auto Body Repair, 3rd Edition
Author: Robert Scharff/James Duffy
Publisher: Delmar Publishers
Date of Publication: 1998

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Project supplies and dual cartridge respirator

Last updated: 10/98

Step 3, Form A

Content Review Form
PREREQUISITE COURSE

Target Course: AUTO 039#3: Secondary Automotive Collision Repair & Refinishing

Prerequisite Course: AUTO 038#3: Basic Automotive Collision Repair & Refinishing

Instructions:
List exit competencies (skills) from Prerequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline ("upon completion of the course, the student should be able to…")
Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an "X" each needed skill.
Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:
1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

	Exit Skills in Prerequisite Course	Entry Skills Needed for Success in Target Course (Mark with an X if needed.)	Degree of Importance (Rate 1 – 3)
1.	Recognize all safety rules and regulations.	Test.	X
2.	Identify the safe use and care of tools, chemicals, and correct protective clothing and safety gear for various situations.		X
3.	Identify and operate the following welding equipment: A. Oxyacetylene welding and brazing B. MIG welding C. Plasma arc cutting D. Spot welding		X
4.	Analyze and demonstrate the following repairs: A. Basic body damage repair		X
5.	Identify, apply, and finish various types of plastic fillers.		X
6.	Describe and identify automotive construction, uni-body and conventional.		X
7.	List general rules for spray equipment/techniques.		X X
8.	Operate spray equipment for both priming/painting.		X
9.	List laws and regulations set fourth by SCAQMD.		X
10.	List and explain the functions of the three types of undercoats.		X
11.	Identify/describe a required respirator program.		X
12.	Have the knowledge and skills to pass the Automotive Service Excellence (ASE) National		

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