HIGHLAND COMMUNITY COLLEGE

Syllabus

ACR165 Non-Structural Analysis and Damage Repair II
4 Credit Hours (Lecture & Lab)
Prerequisites: ACR115
C & I Revision Date: 02/14/2025

Department:

Automotive Collision and Refinishing Technology

Course Description:

Through a variety of classroom and/or lab/shop learning and assessment activities, students in this course will: identify trim and hardware to be protected; examine what to consider when working with movable glass; perform outer body panel repairs; Perform outer body replacements and adjustments; Perform metal straightening techniques; Perform body filling techniques; Perform metal finishing techniques; Use welding procedures in non-structural damage repair; Distinguish between mechanical and electrical components; apply safety standards for the collision repair industry; use cutting procedures in non-structural damage repair; and determine procedures necessary for working with plastics and adhesives.

Course Competencies:

The learning outcomes and competencies detailed in this syllabus meet or exceed the learning outcomes and competencies specified by the Postsecondary Technical Education Authority (TEA) for this course as approved by the Kansas Board of Regents.

Upon completion of the course, the student should be able to:

1. Identify trim and hardware to be protected
    a. Inspect, remove, store, and replace exterior trim and moldings. HP-I
    b. Inspect, remove, store, and replace interior trim and components. HP-I
    c. Inspect, remove, and replace repairable plastics and other components that are recommended for off-vehicle repair. HP-I
2. Examine what to consider when working with movable glass
    a. Protect panels, glass, and parts adjacent to the repair area. HP-I
    b. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-I
3. Perform outer body panel repairs
    a. Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I
    b. Determine the extent of damage to aluminum body panels; repair or replace. HP-G
    c. Straighten and rough-out contours of damaged panels to a suitable condition forbody filling or metal finishing using power tools, hand tools, and weld-on pull attachments. HP-I
    d. Weld damaged or torn steel body panels; repair broken welds. HP-I
    e. Restore corrosion protection. HP-I
4. Perform outer body replacements and adjustments
    a. Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I

b. Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies. HP-I
c. Determine the extent of damage to aluminum body panels; repair or replace. HP-G
d. Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I
e. Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. HP-I
f. Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware. HP-I
g. Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware. HP-I
h. Inspect, remove, replace and align front fenders, headers, and other panels. HP-I
i. Diagnose and repair water leaks, dust leaks, and wind noise. HP-G

5. Perform metal straightening techniques
    a. Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I
    b. Determine the extent of damage to aluminum body panels; repair or replace. HP-G
    c. Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments. HP-I
    d. Remove paint from the damaged area of a body panel. HP-I
    e. Locate and reduce surface irregularities on a damaged body panel. HP-I
    f. Demonstrate hammer and dolly techniques. HP-I
    g. Determine the proper metal finishing techniques for aluminum. HP-G
6. Perform body filling techniques
    a. Remove paint from the damaged area of a body panel. HP-I
    b. Locate and reduce surface irregularities on a damaged body panel. HP-I
    c. Demonstrate hammer and dolly techniques. HP-I
    d. Mix body filler. HP-I
    e. Apply body filler; shape during curing. HP-I
    f. Rough sand cured body filler to contour; finish sand. HP-I
    g. Determine the proper metal finishing techniques for aluminum. HP-G
    h. Determine proper application of body filler to aluminum. HP-G
7. Perform metal finishing techniques
    a. Remove paint from the damaged area of a body panel. HP-I
    b. Locate and reduce surface irregularities on a damaged body panel. HP-I
    c. Demonstrate hammer and dolly techniques. HP-I
    d. Heat shrink stretched panel areas to proper contour. HP-I
    e. Cold shrink stretched panel areas to proper contour. HP-I
    f. Determine the proper metal finishing techniques for aluminum. HP-G
8. Use welding procedures in non-structural damage repair
    a. Identify weldable and non-weldable materials used in collision repair. HP-I
    b. Weld and cut high-strength steel and other steels. HP-I
    c. Weld and cut aluminum. HP-G
    d. Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I
    e. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. HP-I
    f. Store, handle, and install high-pressure gas cylinders. HP-I

g. Determine work clamp (ground) location and attach. HP-I
h. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions. HP-I
i. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-I
j. Protect computers and other electronic control modules during welding procedures. HP-I
k. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld through primer if necessary, and clamp as required. HP-I
l. Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. HP-I
m. Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet. HP-I
n. Perform visual and destructive tests on each weld type. HP-I
o. Identify the causes of various welding defects; make necessary adjustments. HP-I
p. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. HP-I
q. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.) HP-G

9. Distinguish between mechanical and electrical components
    a. Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan. HP-I
    b. Inspect, remove, store, and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair. HP-G
    c. Protect computers and other electronic control modules during welding procedures. HP-I
10. Apply safety standards for the collision repair industry
    a. Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. HP-I
    b. Identify safety and personal health hazards according to OSHA. HP-I
    c. Inspect spray environment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards. HP-I
    d. Select and use the NIOSH approved personal sanding respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. HP-I
    e. Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.). HP-I
11. Use cutting procedures in non-structural damage repair
    a. Identify weldable and non-weldable materials used in collision repair. HP-I
    b. Weld and cut high-strength steel and other steels. HP-I
    c. Weld and cut aluminum. HP-G
    d. Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. HP-I
    e. Protect computers and other electronic control modules during welding procedures. HP-I

f. Identify cutting process for different materials and locations perform cutting operation. HP-I

12. Determine procedures necessary for working with plastics and adhesives
    a. Identify the types of plastics; determine repairability. HP-I
    b. Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts. HP-I
    c. Replace or repair rigid, semi-rigid, and flexible plastic panels. HP-G
    d. Remove or repair damaged areas from rigid exterior composite panels. HP-G
    e. Replace bonded rigid exterior composite body panels; straighten or align panel supports. HP-G

Course Content:

A. Trim and Hardware
B. Movable glass
C. Outer Body Panel Repair
D. Outer Body Replacement and Adjustments
E. Metal straightening Techniques
F. Body Filling Techniques
G. Metal Finishing Techniques
H. Welding Repair of Non-Structural Damage
I. Mechanical and Electrical Components
J. Collision Repair Industry
K. Cutting on Non-Structural damage
L. Plastics and Adhesives Procedures

Learning Assessments:

Assessments may include quizzes, tests, project work, demonstrated competence, instructor observation, weekly assignments and/or written papers.

Instructional Materials:

Textbook: Duffy, J.E. (2015). Auto Body Repair Technology. (6th ed.). Boston, MA: Cengage Learning. ISBN: 9781133702856.

Textbook: Duffy, J.E. (2015). Tech Manuel for Duffy's Auto Body Repair Technology. (6th ed.). Boston, MA: Cengage Learning. SBN: 9781133702863.

Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the "Disabilities Self-Identification Form" on our Disability Services website.

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

A Note on Harassment, Discrimination and Sexual Misconduct

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an online report about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our Equity Grievance Policy.