

SYLLABUS

DATE OF LAST REVIEW: 09/2019

CIP CODE: 47.0603

SEMESTER: Departmental Syllabus

COURSE TITLE: Structural Analysis and Damage Repair 4

COURSE NUMBER: ACRT0242

CREDIT HOURS: 3

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

E-MAIL: KCKCC issued email accounts are the official means for electronically communicating with our students.

PREREQUISITE(S): ACRT0100, ACRT0140, ACRT0240, ACRT0241

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore, <http://www.kckccbookstore.com/>, for the required texts for your particular class.

COURSE DESCRIPTION: Upon the completion of this course the student will be able to perform advanced welding and cutting techniques for structural repair. The student will perform inspection and measurement of a unibody and a body over frame vehicle. The student will repair a damaged unibody or a body over frame vehicle to industry standards. Live customer work will continue.

METHOD OF INSTRUCTION: A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE:

- I. 1.A Frame Inspection and Repair
- II. 1.B Unibody inspection, Measurement, and repair
- III. 1.C Fixed Glass

- IV. 1.D Metal Welding and Cutting
- V. 4.A Safety Precautions

EXPECTED LEARNER OUTCOMES:

- A. The student will be able to identify the safety requirements pertaining to structural damage repair
- B. The student will be able to perform advanced welding and cutting techniques for structural repair.
- C. The student will be able to perform inspection and measurement of unibody for structural repair
- D. The student will be able to repair unibody direct and indirect damage.
- E. The student will be able to perform frame inspection and measurement procedures
- F. The student will be able to repair frame to industry standards
- G. The student will be able to remove fixed glass

Course Competencies:

Upon successful completion of this course: in the classroom or classroom shop setting and by meeting any institution-required NATEF Tasks from the criteria outlined below. NATEF Guidelines of: 95% of HP-I items must be taught in the curriculum; 90% of HP-G items must be taught in the curriculum

The student will be able to identify the safety requirements pertaining to structural damage repair

(Linked External Standards 4.A Safety Precautions)

- 1. The student will be able to identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. (HP-I) (4.A.1)(EDS02 module 1 REF01 module 4 REF03 modules 2,4 WKR01 module3)
- 2. The student will be able to identify safety and personal health hazards according to OSHA guidelines and the Right to Know Law. (HP-I) (4.A.2)(WKR01 module1)
- 3. The student will be able to inspect spray environment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards. (HP-I)(4.A.3)(
- 4. The student will be able to select and use the NIOSH approved personal sanding respirator. The student will be able to inspect condition and ensure fit and operation. The student will be able to perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation. (HP-I) (4.A.4)(WKR01 module 4)
- 5. The student will be able to 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) (4.A.6)(EDS02 modules 1,2,3,4,5,6,7 REF02 module 2 REF03 modules 2,4 WKR01 module 4)

The student will be able to perform advanced welding and cutting techniques for structural repair.

(Linked External Standards 1.D Metal The student will be able to welding and Cutting)

- 6. The student will be able to identify weldable and non-weldable materials used in collision repair. (HP-I)(1.D.1)(FCR01 module 1)
- 7. The student will be able to weld and cut high-strength steel and other steels. (HP-I)(1.D.2)(WCS01 v.1.2 modules 1,2,3,4 WCS01 v.1.3 modules 1,2,3,4,5)

8. The student will be able to weld and cut aluminum. (HP-G)(1.D.3)(WCS01 modules 1,2)
9. The student will be able to determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. (HP-I)(1.D.4)(WCS01 module 1)
10. The student will be able to 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)(1.D.5)(WCS01 module 1)
11. The student will be able to store, handle, and install high-pressure gas cylinders. (HP-I)(1.D.6)(WCS01 module 1)
12. The student will be able to determine work clamp (ground) location and attach. (HP-I)(1.D.7)(WCS01 module 1)
13. The student will be able to 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)(1.D.8)(WCS01 v.1.2 module 1 WCS01 v.1.3 modules 1,2,3,4,5)
14. The student will be able to protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. (HP-I)(1.D.9)(WCS01 module 1)
15. The student will be able to protect computers and other electronic control modules during welding procedures. (HP-I)(1.D.10)(WCS01 module 1)
16. The student will be able to 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)(1.D.11)(WCS01 module 1)
17. The student will be able to determine the joint type (butt weld with backing, lap, etc.) for weld being made. (HP-I)(1.D.12)(SPS01 v.3.1 module 1 SPS01 v.3.2 modules 1,2 SPS02 v.3.1 module 1 SPS v.3.2 module 2 SPS03 modules 2,3)
18. The student will be able to determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. (HP-I)(1.D.13)(SPS01 v.3.1 module 1 SPS01 v.3.2 modules 1,2 SPS02 v.3.1 module 1 SPS v.3.2 module 2 SPS03 modules 2,3)
19. The student will be able to perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet weld. (HP-I)(1.D.14)(WCS01 v.1.2 modules 2,3,4 WCS01 v.1.3 modules 1,2,3,4,5)
20. The student will be able to perform visual and destructive tests on each weld type. (HP-I)(1.D.15)(WCS01 v.1.2 modules 2,3,4 WCS01 v.1.3 modules 2,3,4,5)
21. The student will be able to identify the causes of various welding defects; make necessary adjustments. (HP-I)(1.D.16)(WCS01 v.1.2 module 1 WCS01 v.1.3 modules 1,2,3,4,5)
22. The student will be able to identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. (HP-I)(1.D.17)(WCS01 module 1)
23. The student will be able to identify cutting process for different materials and locations; perform cutting operation. (HP-I)(1.D.18)(WCS05 module 4)
24. The student will be able to identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, silicon bronze, etc.) (HP-G)(1.D.19)(ADH01 v.1.2 module 1 ADH01 v.1.3 modules 1,2 SPS01 v.3.1 module 1 SPS01 v.3.2 modules 1,2 SPS03 module 4 WCS04 v.2.1 modules 1,2,3 WCs04 v.2.2 modules 1,2,3,4)

The student will be able to perform inspection and measurement of unibody for structural repair

(Linked External Standards 1.B Unibody The student will be able to inspection, Measurement, and The student will be able to repair)

25. The student will be able to analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems. (HP-I)(1.B.1)(DAM03 v.2.2 modules 4,6 DAM03 v.2.4 module 6 Dam06 module 2)
26. The student will be able to diagnose and measure unibody damage using tram and self-centering gauges. (HP-I) (1.B.3)(MEA01 modules 1, 2)
27. The student will be able to determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle. (HP-G) (1.B.4)(DAM03 module 6 DAM06 module 2 DRT01 modules2,5 MEA01 module 6)
28. The student will be able to diagnose and measure unibody vehicles using a dedicated (fixture) measuring system. (HP-G) (1.B.5)(MEA01 module 2)
29. The student will be able to diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, laser). (HP-G)(1.B.6)(DAM02 v.2.1 module 1 DAM02 v.2.2 module 3 MEA01 module 2)
30. The student will be able to determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. (HP-I)(1.B.7)(DAM02 v.2.1 modules 1,3 DAM02 v.2.2 module 2 FCR01 v.2.1 module 2 FCR01 v.2.2 modules 2,3 SSS01 module 1)
31. The student will be able to identify heat limitations in unibody vehicles. (HP-I) (1.B.15)(FCR01 module 1 SSS01 module 4)
32. The student will be able to identify proper cold stress relief methods. (HP-I)(1.B.16)(SSS01 module 4)
33. The student will be able to determine the extent of damage to aluminum structural components; repair, weld, or replace. (HP-G)(1.B.20)(DAM05 module 3 SPA01 modules 1,2 SPA02 modules 1,2 SSA01 modules 1,2,3)
34. The student will be able to analyze and identify crush/collapse zones. (HP-I)(1.B.21)(SPS01 v.3.1 modules 1,4,6 SPS01 v.3.2 modules1,2)

The student will be able to repair unibody direct and indirect damage.

(Linked External Standards1.B Unibody The student will be able to inspection, Measurement, and The student will be able to repair 1.D Metal The student will be able to welding and Cutting)

35. The student will be able to realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering and chassis alignment problems. (HP-G) (1.B.2)(DRT01 module 5 STE01 module 3 STE02 modules 1,2,3 STE03 modules 1,2,3,4)
36. The student will be able to attach anchoring devices to vehicle; remove or reposition components as necessary. (HP-I)(1.B.8)(MEA01 module 6 SSS01 module 2)
37. The student will be able to straighten and align cowl assembly. (HP-G)(1.B.9)(SPS v.3.1 module 3 SPS02 v.3.2 modules 1,2 SSS01 module 5)
38. The student will be able to straighten and align roof rails/headers and roof panels. (HP-G)(1.B.10)(EXT02 module 4 SSS01 module 5)
39. The student will be able to straighten and align hinge and lock pillars. (HP-G)(1.B.11)(SPS02 v.3.1 modules 3,4 SPS02 v.3.2 modules 1,2 SSS01 module 5)
40. The student will be able to straighten and align vehicle openings, floor pans, and rocker panels. (HP-G) (1.B.12)(SPS01 v.3.1 modules 2,3,4,6 SPS01 v.3.2 modules 1,2 SPS02 v.3.1 modules 2,3,4,5 SPS02 v.3.2 modules 1,2,3 SSS01 module 5)
41. The student will be able to straighten and align quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points). (HP-

- G)(1.B.13)(EXT02 module 5 SPS01 v.3.1 modules 3,7 SPS01 v.3.2 modules 1,2 SSS01 module 5)
42. The student will be able to straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.). (HP-G)(1.B.14)(SPS01 v.3.1 modules 3,4 SPS01 v.3.2 modules 1,2 SSS01 module5)
 43. The student will be able to repair damage using power tools and hand tools to restore proper contours and dimensions. (HP-I)(1.B.17)(SSS01 module5)
 44. The student will be able to remove and replace damaged sections of structural steel body panels. (HP-G)(1.B.18)(SPS01 v.3.1 modules 3,6 SPS01 v.3.2 modules 1,2 SPS02 v.3.1 modules 2,3,4,5 SPS02 v.3.2 modules 1,2)
 45. The student will be able to restore corrosion protection to repaired or replaced unibody structural areas. (HP-I) 1.B.19)(CPS01 module 3
 46. The student will be able to determine the extent of damage to aluminum structural components; repair, weld, or replace. (HP-G)(1.B.20)(DAM05 module 3 SPA01 modules 1,2 SPA02 modules 1,2 SSA01 modules 1,2,3)

The student will be able to perform frame inspection and measurement procedures

(Linked External Standards 1.A Frame The student will be able to inspection and The student will be able to repair)

47. The student will be able to diagnose and measure structural damage using tram and self-centering gauges. (HP-I)(1.A.1)(DAM02 v.2.1 module 1 DAM02v.2.2 modules 2,3 MEA01 modules1,2)
48. The student will be able to attach vehicle to anchoring devices. (HP-I)(1.A.2)(DRT01 module 5 STE01 module 3 STE02 modules 1,2,3 STE03 modules 1,2,3,4)
49. The student will be able to analyze, straighten and align mash (collapse) damage. (HP-G)(1.A.3)(MEA01 module 4 SSS01 module 5)
50. The student will be able to analyze, straighten and align sag damage. (HP-G)(1.A.4)(MEA01 module 4 SSS01 module 5)
51. The student will be able to analyze, straighten and align sidesway damage. (HP-G)(1.A.5)(MEA01 module 4 SSS01 module 5)
52. The student will be able to analyze, straighten and align twist damage. (HP-G)(1.A.6)(MEA01 module 4 SSS01 module 5)
53. The student will be able to analyze, straighten and align diamond frame damage. (HP-G)(1.A.7)(MEA01 module 4 SSS01 module 5)
54. The student will be able to analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems. (HP-I)(1.A.10)(DAM03 v.2.2 modules 4,6 DAM03 v.2.4 module 6 DAM06 module 2)
55. The student will be able to diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser). (HP-G)(1.A.14)(DAM02 v.2.1 module 1 DAM02 v.2.2 module 3 MEA01 module 2)
56. The student will be able to determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair. (HP-I)(1.A.16)(DAM02 v.2.1 modules1,3 DAM02 v.2.2 module 2 FCR01 v.2.1 module 2 FCR01 v.2.2 modules 2,3 SSS01 module 1)
57. The student will be able to analyze and identify crush/collapse zones. (HP-I)(1.A.17)(SPS03 module 3 SPS08 modules1,3)

The student will be able to repair frame to industry standards

- (Linked External Standards** 1.A Frame The student will be able to inspection and The student will be able to repair 1.D Metal The student will be able to welding and Cutting)
58. The student will be able to attach vehicle to anchoring devices. (HP-I)(1.A.2)(DRT01 module 5 STE01 module 3 STE02 modules 1,2,3 STE03 modules 1,2,3,4)
 59. The student will be able to analyze, straighten and align mash (collapse) damage. (HP-G)(1.A.3)(MEA01 module 4 SSS01 module 5)
 60. The student will be able to analyze, straighten and align sag damage. (HP-G)(1.A.4)(MEA01 module 4 SSS01 module 5)
 61. The student will be able to analyze, straighten and align sidesway damage. (HP-G)(1.A.5)(MEA01 module 4 SSS01 module 5)
 62. The student will be able to analyze, straighten and align twist damage. (HP-G)(1.A.6)(MEA01 module 4 SSS01 module 5)
 63. The student will be able to analyze, straighten and align diamond frame damage. (HP-G)(1.A.7)(MEA01 module 4 SSS01 module 5)
 64. The student will be able to remove and replace damaged structural components. (HP-G)(1.A.8)(SPS03 modules 3,5)
 65. The student will be able to restore corrosion protection to repaired or replaced frame areas. (HP-I)(1.A.9)(CPS01 module 3)
 66. The student will be able to align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems. (HP-G) (1.A.11)(DRT01 module 5 STE01 module 3 STE02 modules 1,2,3 Ste03 modules 1,2,3,4)
 67. The student will be able to identify heat limitations in structural components. (HP-I)(1.A.12)(FCR01 module 1 SSS01 module 4)
 68. The student will be able to restore structural foam. (HP-G)(1.A.13)(FOM01 modules 1,2,3,4)
 69. The student will be able to identify weldable and non-weldable materials used in collision repair. (HP-I) (1.D.1)(FCR01 module 1)
 70. The student will be able to weld and cut high-strength steel and other steels. (HP-I)(1.D.2)(WCS01 v.1.2 modules 1,2,3,4 WCS01 v.1.3 modules 1,2,3,4,5)
 71. The student will be able to weld and cut aluminum. (HP-G)(1.D.3)(WCS01 modules 1,2)
 72. The student will be able to determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. (HP-I)(1.D.4)(WCS01 module 1)
 73. The student will be able to 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)(1.D.5)(WCS01 module 1)
 74. The student will be able to store, handle, and install high-pressure gas cylinders. (HP-I)(1.D.6)(WCS01 module 1)
 75. The student will be able to determine work clamp (ground) location and attach. (HP-I)(1.D.7)(WCS01 module 1)
 76. The student will be able to 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)(1.D.8)(WCS01 v.1.2 module 1 WCS01 v.1.3 modules 1,2,3,4,5)
 77. The student will be able to protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations. (HP-I)(1.D.9)(WCS01 module 1)
 78. The student will be able to protect computers and other electronic control modules during welding procedures. (HP-I)(1.D.10)(WCS01 module 1)

79. The student will be able to 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)(1.D.11)(WCS01 module 1)
80. The student will be able to determine the joint type (butt weld with backing, lap, etc.) for weld being made. (HP-I)(1.D.12)(SPS01 v.3.1 module 1 SPS01 v.3.2 modules 1,2 SPS02 v.3.1 module 1 SPS v.3.2 module 2 SPS03 modules 2,3)
81. The student will be able to determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. (HP-I)(1.D.13)(SPS01 v.3.1 module 1 SPS01 v.3.2 modules 1,2 SPS02 v.3.1 module 1 SPS v.3.2 module 2 SPS03 modules 2,3)
82. The student will be able to perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet weld. (HP-I)(1.D.14)(WCS01 v.1.2 modules 2,3,4 WCS01 v.1.3 modules 1,2,3,4,5)
83. The student will be able to perform visual and destructive tests on each weld type. (HP-I)(1.D.15)(WCS01 v.1.2 modules 2,3,4 WCS01 v.1.3 modules 2,3,4,5)
84. The student will be able to identify the causes of various welding defects; make necessary adjustments. (HP-I)(1.D.16)(WCS01 v.1.2 module 1 WCS01 v.1.3 modules 1,2,3,4,5)
85. The student will be able to identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. (HP-I)(1.D.17)(WCS01 module 1)
86. The student will be able to identify cutting process for different materials and locations; perform cutting operation. (HP-I)(1.D.18)(WCS05 module 4)
87. The student will be able to identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, silicon bronze, etc.) (HP-G)(1.D.19)(ADH01 v.1.2 module 1 ADH01 v.1.3 modules 1,2 SPS01 v.3.1 module 1 SPS01 v.3.2 modules 1,2 SPS03 module 4 WCS04 v.2.1 modules 1,2,3 WCs04 v.2.2 modules 1,2,3,4)

The student will be able to remove fixed glass
(Linked External Standards 1.C Fixed Glass)

87. The student will be able to remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials. (HP-G)(1.C.1)(GLA02 modules 1,2,3 PWR01 module 3)
88. The student will be able to remove and reinstall or replace modular glass using recommended materials. (HP-G)(1.C.2)(GLA02 module 3)

ASSESSMENT OF LEARNER OUTCOMES:

Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

Attendance: Attendance will be in accordance with the certifying agency's requirements.

SPECIAL NOTES:

Safety: Attendance is critical throughout the safety instructions and quizzes. Students must complete all of the safety training before the student can advance or go on to the next course.

Caveats:

1. Safety glasses with side shields are required to be worn during lab activities for this course. This is in compliance with accepted eye protection practices and Kansas State Law (K.S.A. 72-5207). Safety glasses must meet American National Standards Institute Z87.1 specifications. (NOTE: Most prescription eyewear does not meet ANSI Z87.1. Students who wear prescription glasses must: a) Provide evidence that existing eyewear meets ANSI Z87.1, or b) Wear cover goggles (if allowable), or c) Purchase and wear ANSI Z87.1 prescription eyewear.
2. Lab Guidelines: In order to assist with the safe and efficient operation of the automotive lab area, students are expected to be familiar with and adhere to the Automotive Student Lab Guidelines.

This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student's progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college's policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the Director of the Academic Resource Center, in Rm. 3354 or call at 913-288-7670 V/TDD.

All enrolled students at Kansas City Kansas Community College are subject to follow all rules, conditions, policies and procedures as described in both the Student Code of Conduct as well as the Student Handbook. All Students are expected to review both of these documents and to understand their responsibilities with regard to academic conduct and policies. The Student Code of Conduct and the Student Handbook can be found on the KCKCC website.

