COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Mechanical and Electrical Components
COURSE NUMBER	ACRT 0180
DIVISION	Career and Technical Education
DEPARTMENT	ACRT
CIP CODE	47.0603
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 1.5 Lab: 3 Clinical: X
PREREQUISITES	**ACRT 0100 Safety & Orientation** **ACRT 0101 OSHA 10**
COREQUISITES	**None**
COURSE PLACEMENT	**None**

COURSE DESCRIPTION
Through classroom and/or lab/shop learning and assessment activities, in this course students will: determine how to diagnose steering and suspension; diagnose electrical concerns; complete headlamp and fog/driving lam assemblies and repairs; demonstrate self-grounding procedures for handling electronic components; determine diagnostics, inspection and service needs for brake system hydraulic components; examine components of heating and air conditioning systems; determine the inspection service and repair needs for collision damaged cooling system components; distinguish between the under car components and systems; and determine the diagnosis, inspection and service requirements of active and passive restraint systems.

PROGRAM ALIGNMENT
This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:
https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES
1. Demonstrate proper safety practices in an automotive shop environment.
2. Demonstrate workplace skills associated with a professional automotive shop.
3. Describe the advanced elements of automotive technology including service information, tools, equipment, and maintenance procedures

TEXTBOOKS
http://kckccbookstore.com/

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. 3.A Suspension and Steering
II. 3.B Electrical
III. 3.C Brakes
IV. 3.D Heating and Air Conditioning
V. 3.E Cooling Systems
VI. 3.F Drive Train
VII. 3.G Fuel, Intake and Exhaust Systems
VIII. 3.H Restraint Systems

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. Determine how to diagnose steering and suspension

1. Identify one time use fasteners. (HP-I)(3.A.1)(STE02 modules 1,3).
2. Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts. (HP-G)(3.A.2)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 4).
3. Inspect and adjust (where applicable) steering linkage geometry (attitude/parallelism). HP-G)(3.A.5)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 2,3).
4. Inspect and replace pitman arm. HP-G)(3.A.6)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 2).
5. Inspect and replace relay (center link/intermediate) rod. HP-G) (3.A.7)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 2).
6. Inspect, remove and replace idler arm and mountings. HP-G)(3.A.8)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 2).
7. Inspect, remove and replace tie rod sleeves, clamps, and tie rod ends. HP-G) (3.A.9)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 2,3).
8. Inspect, remove and replace steering linkage damper. (HP-G) (3.A.10)(STE03 module 2).
9. Inspect, remove and replace upper and lower control arms. (HP-G) (3.A.11)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1,2).
10. Inspect, remove and replace upper and lower control arm bushings, shafts, and rebound bumpers. (HP-G)(3.A.12) (DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1.
11. Inspect, remove and replace upper and lower ball joints. (HP-G) (3.A.13)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1).
12. Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc. (HP-G)(3.A.14)(DAM03 v.2.2 module 6 DAM06 module 2 STE01 module 3 STE02 module 1).

13. Inspect, remove and replace front suspension system coil springs and spring insulators (silencers). (HP-G)(3.A.15)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1,3).
14. Inspect, remove, replace, and adjust suspension system torsion bars, and inspect mounts. (HP-G)(3.A.16)(STE02 modules 1,3).
15. Inspect, remove and replace stabilizer bar bushings, brackets, and links. (HP-G) (3.A.17)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1).
16. Inspect, remove and replace MacPherson strut cartridge or assembly, upper bearing, and mount. (HP-G)(3.A.18)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1).
17. Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts. HP-G)(3.A.19)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 2).
18. Inspect, remove, and replace suspension system leaf spring(s), leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. (HP-G) (3.A.20)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 3).
19. Inspect axle assembly for damage and misalignment. (HP-G) (3.A.21)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1,2).
20. Inspect, remove and replace shock absorbers. (HP-G)(3.A.22)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 3).
21. Diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings. (HP-G)(3.A.23)(STE05 module 3).
22. Inspect, remove, replace, and align front and rear frame (cradles/sub). (HP-G)(3.A.25)(DAM03 module 6).
23. Inspect, remove and replace steering shaft U-joint(s), flexible coupling(s), collapsible columns, and steering wheels. (HP-G)(3.A.27)(DAM03 v.2.2 module 6 DAM06 module 2 STE03 module 1).
24. Identify toe-out-on-turns (turning radius) related problems; determine needed repairs. (HP-I)(3.A.38)(DAM03 v.2.2 module 6 DAM06 module 2 STE04 module 5).
25. Identify SAI (steering axis inclination), included angle, and KPI (king pin inclination) related problems; determine needed repairs. (HP-I) (3.A.39)(DAM03 v.2.2 module 6 DAM06 module 2 STE02 module 1 STE04 module 5).
26. Identify thrust angle related problems; determine needed repairs. (HP-I) (3.A.40)(DAM03 v.2.2 module 6 DAM06 module 2 STE04 module 2).
27. Check for front wheel setback; determine needed repairs. (HP-I) (3.A.41)(DAM03 v.2.2 module 6 DAM06 module 2 STE04 module 2).
28. Inspect tires, identify direction of rotation and location; check and adjust air pressure. (HP-I)(3.A.43)(DAM03 v.2.2 module 6 DAM06 module 2 STE04 module 2).
29. Reinstall wheels and torque lug nuts. (HP-I)(3.A.47)(STE01 module 2).

B. Diagnose electrical concerns

30. Inspect, test, and replace fusible links, circuit breakers, and fuses. (HP-I) (3.B.4)(DAM03 module 3 ELE01 module 2).
31. Inspect, clean, and replace battery. (HP-I)(3.B.6)(DAM03 module 3 LSC01 module1).
32. Dispose of batteries and battery acid according to local, state, and federal requirements. (HP-G)(3.B.7)(LSC01 module1).
33. Perform slow/fast battery charge. (HP-I)(3.B.8)(LSC01 module1).

34. Check operation of exterior lighting; determine needed repairs. (HP-I) (3.B.12)(LSC01 module 4).
35. Inspect, remove and replace power seat, motors, linkages, cables, etc. (HP-G) (3.B.18)(PWR01 module 4).
36. Inspect, remove and replace components of electric door and hatch/trunk lock. (HP-G(3.B.19)(ELE02 module 3 PWR01 module 6).
37. Inspect, remove and replace components of keyless lock/unlock devices and alarm systems. (HP-G)(3.B.20)(DAM v.2.4 module 5 PWR01 module 5).
38. Inspect, remove and replace components of electrical sunroof and convertible top. (HP-G)(3.B.21)(DAM04 module 2 GLA01 module4).

C. Perform headlamp and fog/driving lamp assemblies and repairs

39. Aim headlamp assemblies and fog/driving lamps; determine needed repairs. (HP-I) (3.B.13)(LSC01 module 4).

D. Demonstrate self-grounding procedures for handling electronic components

40. Demonstrate the proper self-grounding procedures for handling electronic components. (HP-I)(3.B.24)(ELE02 module 4).

E. Determine diagnosis, inspection and service needs for brake system hydraulic components

41. Identify, handle, store, and install appropriate brake fluids; dispose of in accordance with federal, state, and local regulations. (HP-G)(3.C.3)(BRA01 module 1).
42. Reinstall wheel and torque lug nuts. (HP-I)(3.C.7)(ABR01 module 2 BRA01 module 2 STE01 module 2).
43. Check parking brake system operation. (HP-I)(3.C.10)(ABR01 module 1 BRA01 module 3).
44. Identify the proper procedures for handling brake dust. (HP-G)(3.C.13)(BRA01 module 2).
45. Check for bent or damaged brake system components. (HP-G)(3.C.14)(ABR01 module 1 BRA01 module 2 DAM03 v.2.2 module 5 DAM03 v.2.4 module 7).

F. Examine components of heating and air conditioning systems

46. Identify and comply with environmental concerns relating to refrigerants and coolants. (HP-G)(3.D.1)(AIR01 module 2,3 HEA01 module 4 WKR01 module6).
47. Locate and identify A/C system service ports. (HP-I)(3.D.3)(AIR01 module 3 DAM03 v.2.2 module 1 DAM03v.2.4 module 2.

G. Determine the inspection, service and repair needs for collision damaged cooling system components

48. Check engine cooling and heater system hoses and belts; determine needed repairs. (HP-I)(3.E.1)(DAM03 v.2.2 module 1 DAM03 v.2.4 modules 1,2 HEA01 modules 3,7).
49. Inspect, test, remove, and replace radiator, pressure cap, coolant recovery system, and water pump. (HP-G)(3.E.2)(DAM03 module 1 HEA01 module 2).

H. Distinguish between the under car components and systems

50. Inspect, remove and replace half shafts and axle constant velocity (CV) joints. (HP-G)(3.F.6)(DAM03 v.2.2 module 4 DAM03 v.2.4 module 6 DRT01 module 4).

51. Inspect, remove and replace drive shafts and universal joints. (HP-G) (3.F.7)(DAM03 v.2.2 module 4 DAM03 v.2.4 module 6 DRT01 module 4).
52. Inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields. (HP-G)(3.G.1)(DAM03 v.2.2 module 3 DAM04 v.2.4 module 3,6 DRE01 module 1 FUE01 module2).
53. Inspect, remove and replace fuel tank, fuel tank filter, fuel cap, fuel filler hose, and inertia switch; inspect and replace fuel lines and hoses; check fuel for contaminants. (HP-G)(3.G.2)(DAM03 v.2.2 module 3 DAM04 v.2.4 module 6 DRE01 module 1 FUE01 module2).

I. Determine the diagnosis, inspection and service requirements of active and passive restraint systems

54. Inspect, remove, and replace seatbelt and shoulder harness assembly and components. (HP-G)(3.H.2)(DAM04 module 1 RES01 module 3,4).
55. Restraint system mounting areas for damage; repair as needed. (HP-G) (3.H.3)(DAM04 module 1 RES01 module 3).
56. Verify proper operation of seatbelt. (HP-G)(3.H.4)(RES01 module3).
57. Deactivate and reactivate Supplemental Restraint System (SRS). (HP-G) (3.H.5)(RES01 module 1).
58. Inspect, remove and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation. (HP-G)(3.H.6)(DAM04 module 1 RES01 module1).
59. Verify that Supplemental Restraint System (SRS) is operational. (HP-I) (3.H.7)(RES01 module 2).

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.