**SYLLABUS**

**DATE OF LAST REVIEW:** 12/09/2014

**CIP CODE:** 47.0604

**SEMESTER:** Departmental Syllabus

**COURSE TITLE:** Steering and Suspension 1

**COURSE NUMBER:** AUTT0141

**CREDIT HOURS:** 3

**INSTRUCTOR:** Departmental Syllabus

**OFFICE LOCATION:** Departmental Syllabus

**OFFICE HOURS:** Departmental Syllabus

**TELEPHONE:** Departmental Syllabus

**EMAIL:** Departmental Syllabus

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

**PREREQUISITE(S):** AUTT0101, AUTT0102, or approval from instructor

**REQUIRED TEXT AND MATERIALS:**
Please see bookstore for current textbook(s) and other required material.

**COURSE DESCRIPTION:**
In this course students will: document fundamental suspension system concerns; perform fundamental diagnostics of steering systems; perform fundamental repairs of steering systems; perform fundamental diagnostics of suspension systems; perform fundamental repairs of suspension systems; determine the need for wheel alignment and adjustment; perform fundamental diagnostics of wheel and tire systems; perform fundamental repairs of wheel and tire systems through a variety of learning and assessment activities.

**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, and panels, conferencing,
performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

**COURSE OUTLINE:**
All students must 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/materials in accordance with local, state, and federal safety and environmental regulations.

I. General Suspension and Steering Systems Service
   A. Work orders
   B. Vehicle identification
   C. Customer interview
   D. Service history
   E. Researching vehicle and service information, service precautions
   F. Technical service bulletins
   G. Locating vehicle and major component identification numbers

II. Steering Systems Diagnosis and Repair
   A. Steering column noises, looseness, and binding
   B. Steering gear (non-rack and pinion)
   C. Steering gear (rack and pinion)
   D. Power steering fluid type
   E. Fluid leakage
   F. Electronically controlled steering systems
   G. Scan tool
   H. Hybrid vehicle power steering and safety
   I. Sensors, switches, and actuators
   J. Idle speed compensation

III. Related Steering Service
   A. Disabling restraint systems (SRS)
   B. Steering wheel
   C. Clock spring
   D. Steering shaft universal-joint and flexible coupling
   E. Collapsible column, lock cylinder mechanisms
   F. Steering gear bearing preload and sector lash.
   G. Rack and pinion steering gear mountings and bushings
   H. Steering gear inner tie rod ends and bellows boots
   I. Flushing, filling, and bleeding power steering
   J. Power steering pump belt
   K. Power steering pumps
   L. Pulley press and alignment
   M. Power steering hoses and fittings
   N. Steering linkage, relay and idlers
   O. Mountings and dampers
   P. Tie rod ends (sockets), tie rod sleeves, and clamps
   Q. Electronically controlled steering systems
R. Lubricate

IV. Suspension Systems theory
   A. Short and long arm suspension system
   B. Noises, body sway, and ride height
   C. Strut suspension systems, body sway
   D. Electronically controlled suspension systems

V. Suspension Systems Diagnosis, Repair
   A. Upper and lower control arms, bushings, shafts and rebound bumpers
   B. Strut rods and bushings
   C. Upper and/or lower ball joints
   D. Steering knuckle assemblies
   E. Short and long arm suspension system coil springs and spring insulators
   F. Torsion bars and mounts
   G. Stabilizer bar bushings, brackets, and links
   H. Strut cartridge assembly, strut coil spring, insulators, and upper bearing mounts
   I. leaf springs, leaf spring insulators, shackles, brackets, bushings, and mounts
   J. Shock absorbers
   K. Wheel bearings
   L. Lubrication

VI. Wheel Alignment Diagnosis, Adjustment, and Repair
   A. Steering wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns
   B. Pre-alignment inspection and measure
   C. Four-wheel alignment, front and rear wheel caster, camber, toe, steering wheel center
   D. Toe-out-on-turns (turning radius)
   E. SAI (steering axis inclination) and included angle
   F. Rear wheel thrust angle
   G. Front wheel setback
   H. Cradle (sub-frame) alignment

VII. Wheel and tires
   A. Wheel/tire vibration, shimmy, and noise
   B. Wheel, tire, axle flange, and hub run-out
   C. Pull problems
   D. Tire pressure monitoring system.
   E. Wheel and Tire Diagnosis and Repair
   F. Tire inspection, wear patterns, air pressure
   G. Tire rotation
   H. Dismounting, inspection, repair and remounting types of tires
   I. Balance, static and dynamic/first, second and third order vibration
   J. Tire pressure mounting system repair
   K. Wheel torque and lug nuts
   L. Tire repair methods

EXPECTED LEARNER OUTCOMES:
A. The student will be able to explain documentation of fundamental suspension system concerns
B. The student will be able to summarize fundamental diagnostics of steering systems
C. The student will be able to describe fundamental repairs of steering systems
D. The student will be able to perform fundamental diagnostics of suspension systems
E. The student will be able to explain fundamental repairs of suspension systems
F. The student will be able to identify the need for wheel alignment and adjustment
G. The student will be able to explain fundamental diagnostics of wheel and tire systems
H. The student will be able to describe fundamental repairs of wheel and tire systems

**COURSE COMPETENCIES:**

*The student will be able to explain documentation of fundamental suspension system concerns*

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
2. Identify and interpret suspension and steering system concerns; determine necessary action.
3. Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins.
4. Locate and interpret vehicle and major component identification numbers.

*The student will be able to summarize fundamental diagnostics of steering systems*

5. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.
6. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.
7. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.
8. Determine proper power steering fluid type; inspect fluid level and condition.
10. Diagnose power steering fluid leakage; determine necessary action.
11. Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action.
12. Inspect and test electric power assist steering.
13. Identify hybrid vehicle power steering system electrical circuits, service and safety precautions.
14. Diagnose, inspect, adjust, repair or replace components of electronically controlled steering systems (including sensors, switches, and actuators); initialize system as required.
15. Describe the function of the idle speed compensation switch.

*The student will be able to describe fundamental repairs of steering systems*

16. Disable and enable supplemental restraint system (SRS).
17. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
18. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.
19. Adjust non-rack and pinion worm bearing preload and sector lash.
20. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.
21. Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
22. Flush, fill, and bleed power steering system.
23. Remove, inspect, replace, and adjust power steering pump belt.
24. Remove and reinstall power steering pump.
25. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.
26. Inspect and replace power steering hoses and fittings.
27. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
28. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
29. Diagnose, inspect, adjust, repair or replace components of electronically controlled steering systems (including sensors, switches, and actuators); initialize system as required.
30. Lubricate suspension and steering systems.

_The student will be able to perform fundamental diagnostics of suspension systems_

31. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
32. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
33. Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action.

_The student will be able to explain fundamental repairs of suspension systems_

34. Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers.
35. Remove, inspect, and install strut rods and bushings.
36. Remove, inspect, and install upper and/or lower ball joints.
37. Remove, inspect, and install steering knuckle assemblies.
38. Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.
39. Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts.
40. Remove, inspect, and install stabilizer bar bushings, brackets, and links.
41. Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
42. Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
43. Inspect, remove, and replace shock absorbers.
44. Remove, inspect, and service or replace front and rear wheel bearings.
45. Lubricate suspension and steering systems.
The student will be able to identify the need for wheel alignment and adjustment
46. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
47. Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.
48. Prepare vehicle for wheel alignment on the alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber, and toe as required, center steering wheel.
49. Check toe-out-on-turns (turning radius); determine necessary action.
50. Check SAI (steering axis inclination) and included angle; determine necessary action.
51. Check rear wheel thrust angle; determine necessary action.
52. Check for front wheel setback; determine necessary action.
53. Check front and/or rear cradle (subframe) alignment; determine necessary action.

The student will be able to explain fundamental diagnostics of wheel and tire systems
54. Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
55. Measure wheel, tire, axle flange, and hub runout; determine necessary action.
56. Diagnose tire pull problems; determine necessary action.
57. Inspect, diagnose, and calibrate tire pressure monitoring system.

The student will be able to describe fundamental repairs of wheel and tire systems
58. Inspect tire condition; identify tire wear patterns, check and adjust air pressure; determine necessary action.
59. Rotate tires according to manufacturer’s recommendations.
60. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).
61. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
62. Reinstall wheel; torque lug nuts.
63. Inspect tire and wheel assembly for air loss; perform necessary action.
64. Repair tire using internal patch.

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

SPECIAL NOTES:
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: 288-7670.