ATL 140 Course Outline as of Fall 2024

CATALOG INFORMATION

Dept and Nbr: ATL 140 Title: AUTO CHASSIS
Full Title: Automotive Suspension and Steering Systems
Last Reviewed: 1/22/2024

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.00	17.5	Lecture Scheduled	35.00
Minimum	3.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 70.00 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Students will learn automotive suspension and steering fundamentals including diagnosis, inspection, repair, and adjustment of automotive steering, suspension, supplemental restraint, tire pressure monitoring, and alignment systems, and theory of operation. Course prepares students to pass the Automotive Service Excellence (ASE) A4 Suspension & Steering certification test.

Prerequisites/Corequisites:
Course Completion of ATL 101 and ATL 161

Recommended Preparation:
Eligibility for ENGL 1A or equivalent and MATH 25 or equivalent

Limits on Enrollment:

Schedule of Classes Information:
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Recommended: Eligibility for ENGL 1A or equivalent and MATH 25 or equivalent
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Demonstrate shop safety regarding working procedures and hazardous materials and waste handling.
2. Research and identify correct procedures and specifications for maintenance and repair of suspension and steering systems.
3. Perform diagnosis, service, and maintenance procedures in a timely manner to industry standards.

Objectives:
At the conclusion of this course, the student should be able to:
1. Disable and enable Supplemental Restraint System (SRS)
2. Remove and replace steering wheel, center/time Supplemental Restraint System (SRS) coil (clock spring)
3. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms) and determine necessary action
4. Inspect steering shaft universal joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel, and perform necessary action
5. Remove and replace manual or power rack and pinion steering gear, and inspect mounting bushings and brackets
6. Inspect and replace manual or power rack and pinion steering gear inner and outer tie rod ends (sockets) and bellows boots
7. Inspect power steering fluid levels and condition, flush, fill, and bleed power steering system
8. Diagnose power steering fluid leakage, inspect, and replace power steering hoses and fittings
9. Remove, inspect, replace, and adjust power steering pump belt
10. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper

11. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps
12. Diagnose short and long arm and strut suspension system noises, body sway, and uneven riding height concerns, and determine necessary action
13. Remove, inspect and install strut rods and bushings, upper and/or lower ball joints, steering knuckle assemblies, short/long arm coil springs and insulators
14. Remove, inspect, and install stabilizer bar bushings, brackets, transverse links, control arms, bushings, mounts, and links
15. Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount, and shock absorbers
16. Lubricate suspension and steering systems
17. Remove, inspect, and service or replace front and rear wheel bearings
18. Differentiate between steering and suspension concerns using principles of steering geometry (caster, camber, toe, Steering Axis Inclination (SAI))
19. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns, and determine necessary action
20. Perform pre-alignment inspection, measure vehicle riding height, and determine necessary action
21. Check and adjust front and rear wheel camber, caster, and toe, center steering wheel, check toe-out-on-turns, SAI and included angle, and rear wheel thrust angle
22. Inspect and diagnose tire wear patterns, wheel/tire vibration, shimmy, noise, tire pull (lead) problems check and determine necessary action
23. Rotate and balance wheel and tire assemblies and adjust air pressure according to manufacturer's recommendations
24. Measure wheel, tire, axle, and hub runout, and determine necessary action
25. Dismount, inspect, repair, and remount tire on wheel, balance assembly, reinstall wheel, and torque lug nuts
26. Inspection and calibration of tire pressure monitoring systems

Topics and Scope:

Lecture-Related Topics and Scope:
I. Automotive Safety and Shop Practices
II. Proper Care and Manipulation of Basic Hand and Specialty Tools
III. Front and Rear Suspension Types, Fundamentals, Operation, Inspection and Service Procedures, Including Electronic Suspension
IV. Wheel and Tire Fundamentals, Operating, Inspection and Service Procedures
V. Wheel Bearings, Theory, Inspection and Service Procedures
VI. Springs, Struts, and Shock Absorber Fundamentals, Operating and Service Procedures
VII. Steering System Types, Steering Gears, Manual and Power Assisted, Fundamentals, Inspection and Service Procedures
VIII. Wheel Alignment Fundamentals, Angles, Inspection and Service Procedures
IX. Laboratory Practice in The Inspection, Diagnosis, Adjustment and Repair of Automotive Steering and Suspension Systems
X. Noise, Vibration, Harshness, Electronic Steering Suspension Fundamentals and Diagnosis
XI. Tire Pressure Monitoring
XII. Hazardous Waste Handling
XIII. Hybrid, Electric, and Alternative Fuel Safety
XIV. Hybrid, Electric, and Alternative Fuel Applicable Systems Awareness

Lab-Related Topics and Scope:
I. Demonstrate Proper Shop Safety and Working Practices, Including Tools and Equipment, and Hazardous Waste Handling

II. Diagnose, Service, and Repair Suspension System Components
III. Perform Tire and Wheel Diagnosis, Service and Repair
IV. Service Wheel Bearings
V. Diagnose, Service, and Repair of Steering System Components
VI. Perform Pre-Alignment Inspections
VII. Measure Ride Height, Determine Necessary Action
VIII. Perform Various Iterations of Wheel Alignments
IX. Perform Tire Pressure Servicing and Monitoring Calibration

Assignment:

Lecture-Related Assignments:
1. Weekly reading (25-75 pages)
2. Homework consisting of chapter review questions
3. Weekly quizzes and final exam

Lab-Related Assignments:
1. Lab demonstrations related to diagnostics, service, and repair of suspension system components
2. Lab write-ups, such as:
   A. Reading and analyzing lab reports
   B. Making customer recommendations
   C. Writing diagnostic sheets in a neat, complete, and readable manner
3. Lab work, such as:
   A. Disassemble components and subsystems
   B. Inspect components and subsystems
   C. Reassemble components and subsystems

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Homework; lab write-ups	Writing 10 - 20%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab work	Problem solving 5 - 15%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Lab demonstrations	Skill Demonstrations 30 - 40%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes and final exam	Exams 35 - 45%

Other: Includes any assessment tools that do not logically fit into the above categories.

None	Other Category 0 - 0%

Representative Textbooks and Materials:
Automotive Steering and Suspension. Kerwin, James. CDX. 2018 (classic)
Instructor prepared materials