COURSE OUTLINE: AST615 - SUSP/STEER BRAKE SYS

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Course Code: Title	AST615: SUSPENSION/STEERING AND BRAKE SYSTEMS
Program Number: Name	6067: AUTO SERV TN LEVEL I
Department:	MOTIVE POWER APPRENTICESHIP
Academic Year:	2024-2025
Course Description:	This course deals with the study and interrelationship of essential basic fundamentals, composition, construction and operating principles of suspension, steering and brake systems. The student will also inspect and test suspension, steering and braking assemblies using manufacture maintenance procedures. The student will perform tire and rim safety inspections following Ministry Standards, along with performance of wheel balance and the reading of tire wear patterns. Students will be required to follow proper safety procedures when performing the above tasks according to both Sault College Motive Power Department Standards and Vehicle Manufacturers safety regulations and specifications.
Total Credits:	5
Hours/Week:	0
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Essential Employability Skills (EES) addressed in this course:	EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.

Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	EVALUATION PROCESS/GRADING SYSTEM: The final grade for this course will be based on the results of classroom, assignments and shop evaluations weighed as indicated: Classroom 70% of the final grade is comprised of term tests. Shop 30% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude. (Student will be given notice of test and assignment dates in advance)
Books and Required Resources:	Automotive Technology: A Systems Approach by Erjavec Publisher: Cengage Edition: 4th Canadian

Course Outcomes and Learning Objectives:

Course Outcome 1	**Learning Objectives for Course Outcome 1**
Explain the fundamental theories, characteristics and applications relative to suspension systems according to principles of physics.	1.1 Explain and describe the following: The fundamental theories of suspension systems. Hook`s Law centre of gravity sprung / un-sprung weight The characteristics and applications of suspension materials. spring steel tempered steel synthetic rubber fiber composites pneumatics hydraulics negative effects of heating suspension components
Course Outcome 2	**Learning Objectives for Course Outcome 2**
Identify and explain types, and the construction of frames, steering and suspension components according to manufacturers standards.	2.1 Identify various frame types and explain their construction and applications. frames and chassis types frame and chassis damage 2.2 Identify various suspension and steering types and components. non independent semi independent independent short- and long-control arms twin I beam McPherson strut modified strut wishbone strut Hybrid strut

	multi link steering linkage types parallelogram cross steer rack and pinion haltenberger 2.3 Explain the application and construction of suspension and steering components. springs ball joints king pins strut bearings control arms and bushings radius rods strut rods stabilizer bars trailing arms wheel hubs wheel bearings shock absorbers steering linkages
Course Outcome 3	**Learning Objectives for Course Outcome 3**
Explain the operation of suspension and steering systems and components according to principles of physics	3.1 Explain the operation of suspension and steering systems and components. non independent semi independent independent short- and long-control arms twin I beam McPherson strut modified strut strut bearings wishbone strut hybrid strut multi link- springs leaf torsion bars air springs ball joints control arms and bushings radius rods strut rods stabilizers trailing arms steering linkages shock absorbers
Course Outcome 4	**Learning Objectives for Course Outcome 4**
Inspect and test suspension and steering systems and components according to manufacturers	4.1 Inspect and test suspension and steering components. visual inspection dry park check measure trim height

	recommendations.	check for corrosion check for frame damage check springs spring condition and deflection effects of contamination on springs check shock absorbers leaks action attachment perform suspension system inspection control arm bushing control arm sag check wheel bearings preload end-play check ball joints wear check king-pins wear check steering linkages for wear and alignment
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	Explain, test, repair and service tires and wheels in according to manufacturers recommendations.	5.1 Explain the purpose and fundamentals of tires and wheels. centrifugal force static friction kinetic friction torquing wheel nuts effects of water sliding and rolling friction sidewall markings static and dynamic balance nitrogen use 5.2 Explain the construction, types, and application of tires. wheels for cars and light trucks tire materials radial tire construction bias tire construction run flat tires tires, wheels balancing air pressure tread design and traction 5.3 Perform tests and repairs on tire and wheels assemblies. visual inspection check tire matching for dual application wear defects identify and measure radial and lateral wheel and tire run-out determine factors that affect tire wear determine factors that cause cord separation perform static and dynamic wheel balance perform tire repair check tire type mixing and application

	test wheel runout Service tire pressure monitoring systems. Reset , reprogram and calibrate tire pressure monitoring systems
Course Outcome 6	**Learning Objectives for Course Outcome 6**
Explain, identify, inspect and service brake systems and components in according to manufacturers recommendations.	6.1 Explain the fundamentals of braking systems. Pascal`s Law laws of levers, mechanical advantages co-efficient of friction velocity and acceleration 6.2 Identify brake system components. brake fluid brake lines, hoses and fittings master / wheel cylinders calipers brake shoes and disc pads drums and disc hydraulic controls metering valves proportional valves pressure differential valves combination valves auxiliary mechanical brake assemblies 6.3 Explain the construction and operation of brake system components. master cylinder calipers wheel cylinders shoes and pads brake fluid hydraulic controls self-adjusting mechanisms drums and discs auxiliary mechanical brake assemblies 6.4 Inspect and service brake systems. check brake fluid level bleeding flushing condition check disc brakes calipers function / leakage hardware, guides rotor measurements / thickness, runout check drum brakes wheel cylinder function / leakage hardware back plate self-adjusters drum measurements / diameter, out of round

	clean, lube and adjust adjust auxiliary mechanical brake assemblies 6.5 Perform steel brake line fabrication. Bending Flaring ISO Double inverted

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Shop	40%
Theory Tests	60%

Date: November 12, 2024

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.