Prepared: Stephen Kent Approved: Corey Meunier

Course Code: Title	AST715: SUSPENSION/STEERING AND BRAKE SYSTEMS
Program Number: Name	6068: AUTO SERV TN LEVEL 2
Department:	MOTIVE POWER APPRENTICESHIP
Semester/Term:	18S
Course Description:	Upon successful completion the apprentice will have the ability to inspect, test and service suspension and steering systems, the ability to identify and explain the construction and operation of steering gear systems including inspection and testing procedures, the ability to define, explain and calculate wheel alignment angle adjustments, the ability to operate wheel alignment equipment, and the ability to inspect, diagnose disc and drum brake systems - all according to manufacturers` recommendations.
Total Credits:	5
Hours/Week:	0
Total Hours:	42
Essential Employability Skills (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. #2. Respond to written, spoken, or visual messages in a manner that ensures effective communication. #3. Execute mathematical operations accurately. #4. Apply a systematic approach to solve problems. #5. Use a variety of thinking skills to anticipate and solve problems. #6. Locate, select, organize, and document information using appropriate technology and information systems. #7. Analyze, evaluate, and apply relevant information from a variety of sources. #8. Show respect for the diverse opinions, values, belief systems, and contributions of others. #9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. #10. Manage the use of time and other resources to complete projects. #11. Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, D
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:

â€¢ Classroom 70% of the final grade is comprised of term tests.
â€¢ Shop 30% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude.

(Students will be given notice of test and assignment dates in advance)

The following semester grades will be assigned to students:

Grade
Definition Grade Point Equivalent
A+ 90 - 100% 4.00
A 80 - 89%
B 70 - 79% 3.00
C 60 - 69% 2.00
D 50 - 59% 1.00
F (Fail)49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.
S Satisfactory achievement in field /clinical placement or non-graded subject area.
U Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR Grade not reported to Registrar`s office.
W Student has withdrawn from the course without academic penalty.

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
shop	30%
Theory Tests	70%

Books and Required Resources:

Automotive Technology: A Systems Approach by Erjavec
Publisher: Thomson Nelson Learning Canada Edition: 3rd Canadian

Course Outcomes and Learning Objectives:

Course Outcome 1.

inspect, test and service suspension and steering systems in accordance with manufacturersâ€™ recommendations.

Learning Objectives 1.

LEARNING OUTCOMES AND CONTENT

Explain the operation, servicing and inspection of the following suspension and steering components.

- strut assemblies
- wheel hubs

- wheel bearings
- adjusting
- packing
- chassis lubrication
- shock absorbers / dampeners
- adjustable shock absorbers / dampeners
- mechanical
- electronic
- ball joints
- movement â€ axial and radial
- wear indicating
- steering linkage
- movement â€ axial and radial

Perform removal and installation of the following suspension and steering components.

- strut assemblies
- wheel hubs
- wheel bearings

Inspect, test and service the following suspension and steering components.

- inspect strut assemblies
- inspect wheel hubs
- adjust and pack wheel bearings
- check ball joints
- movement â€ axial and radial
- wear indicating
- check steering linkage
- movementâ€ axial and radial

Course Outcome 2.

identify and explain the construction and operation of steering gear system including inspection and testing procedures in accordance with manufacturersâ€™ recommendations.

Learning Objectives 2.

LEARNING OUTCOMES AND CONTENT

Identify and explain the following steering components.

- manual steering gears
- power steering
- power steering pumps
- power steering valves
- fluids
- lines, fittings, hoses
- coolers
- electronic power steering

Explain the operation of manual and power- assisted steering systems.

- manual steering gears â€¢ power steering gears
- recirculating ball

- rack and pinion
- power steering
- recirculating ball
- rack and pinion
- power steering pumps
- gear
- vane
- slipper
- roller
- power steering valves
- directional control
- flow control
- pressure relief

Continued

- fluids
- lines, fittings, hoses
- coolers
- electronic power assist
- four wheel steer

Inspect, test and service power steering pumps and power steering units.

- test manual steering gears
- proper operation
- proper adjustment
- leaks
- test power steering gears
- proper operation
- proper adjustment
- leaks
- test power steering pumps
- proper operation
- leaks
- drive adjustment
- check power steering valves
- operation
- leakage internal / external
- inspect fluids
- cleanliness
- proper levels
- inspect lines, fittings, hoses
- leaks
- fatigue
- inspect coolers
- leaks
- air flow

Perform assigned operations.

- dismantling, inspecting, re-assembling and adjusting of power steering
- gears
- pumps
- check and adjust drive belt tension
- steering linkage lubrication

Course Outcome 3.

define, explain and calculate wheel alignment angle adjustments according to manufacturersâ€™ recommendations.

Learning Objectives 3.

LEARNING OUTCOMES AND CONTENT

Define alignment angles and measurements.

- caster
- camber
- toe-in / toe-out
- steering axis inclination
- turning radius
- trim height
- thrust line
- thrust angle
- geometric centre line
- Ackermans principles
- Included angle
- set back
- scrub radius

Identify alignment types and adjustment styles.

- types of alignment
- two-wheel geometric center line alignment
- two-wheel thrust line alignment
- four-wheel alignment
- eccentrics
- shims / contact shims
- slots
- strut rods
- wedges
- elongating holes

Explain the following wheel alignment adjustments and calculations.

- eccentrics
- shims
- contact shims
- slots
- strut rods
- wedges
- elongating holes

Course Outcome 4.

Operate wheel alignment equipment in accordance with the manufacturers recommendations

Learning Objectives 4.

LEARNING OUTCOMES AND CONTENT

- Explain the operation of vehicle alignment equipment.

- demonstration of
- operating procedures of alignment equipment
- calibration of equipment
- vehicle setup

Measure four wheel alignment angles.

- set up alignment equipment
- measure and record alignment angles

Course Outcome 5.

Inspect, diagnose disc and drum brake systems according to manufacturers recommendations.

Learning Objectives 5.

LEARNING OUTCOMES AND CONTENT

Explain inspection, testing and diagnostic procedures of brake system components in accordance with the manufacturersâ€™ recommendations.

- lines
- flex
- steel
- disc brakes
- rotor thickness / runout / parallelism / condition
- lining thickness / condition
- resurfacing
- drums brakes
- diameter/out of round / condition
- lining thickness / condition
- resurfacing
- brake hydraulic system pressure tests
- brake system operational tests
- in shop
- road test

Perform assigned operations for drum and disc brakes.

- removal and installation procedures for drums, discs, pads and shoes
- adjustment and cleaning procedures for drum and disc brake assemblies
- perform drums brake
- measure diameter / out of round / condition
- measure lining thickness / condition
- resurface drums

Continued

- perform disc brake
- measure rotor thickness / runout / parallelism / condition

	- measure lining thickness / condition - resurface rotor - interpret test results and performance problems - noises - drag or lockup - vibrations - imbalance - perform brake system tests - hydraulic pressure test - performance tests
Date:	Tuesday, April 24, 2018
	Please refer to the course outline addendum on the Learning Management System for further information.