

I. COURSE DESCRIPTION:

In this course the students will focus on the construction, repair and diagnosis of suspension and brake systems. Common sources of vehicle vibration related to suspension, driveline and brakes would be outlined at this time. An introduction to manual and power assisted steering systems and wheel alignment will also be covered.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. *Explain the construction and operating principles of solid and independent suspension system components.*Potential Elements of the Performance:

- Compare and contrast independent suspension systems, short-long arm, twin I beam, McPherson strut and modified strut
- Evaluate the effectiveness of gas shocks vs. hydraulic
- Identify load and non-load-carrying ball joints
- State four types of automotive springs
- Outline radius and strut rods

2. *Dismantle, test and inspect suspension system components.*Potential Elements of the Performance:

- Inspect control arm bushings
- Measure vehicle ride height
- Test shock absorbers
- Remove and replace McPherson struts
- Clean, repack and adjust wheel bearings
- Measure ball joint play using prescribed measuring equipment

3. *Explain the construction, operating principles, testing and servicing of manual and power steering systems.*Potential Elements of the Performance:

- Adjust rack and pinion steering gear mesh load.
- Service manual steering gears.
- Identify power steering pumps, power racks, integral gear boxes, control valves, lines and hoses
- Describe the operation of power steering pumps, power gear boxes and control valves

- Test and inspect power steering pump for pressure and flow
- Analyze power steering system operation using prescribed tools & equipment

4. *Explain the purpose and application of alignment angles and measurements.*

Potential Elements of the Performance:

- Outline the need for wheel alignment
- Define alignment angles, camber, caster, toe, S.A.I., included angle, set back and thrust angle
- Compare alignment types, geometric center line, 2 wheel thrust line and total 4 wheel
- Observe and evaluate the measurement of a vehicle
- Explain the set up procedure of a 4 wheel alignment machine
- Describe 4 methods of adjusting alignment angles, shims, eccentrics, strut rod and slots

5. *Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve and cables.*

Potential Elements of the Performance:

- Compare and contrast materials used to make brake pads and shoes
- Analyze master cylinders, wheel cylinders and calipers to determine operation
- Test combination valve with pressure gauges to check operation
- Inspect brake lines and flex hoses
- Analyze parking brake mechanisms to verify operation
- Machine brake disc's and drums
- Service calipers and drum brake assemblies and verify proper operation

6. *Diagnose brake system faults following manufacturer procedures.*

Potential Elements of the Performance:

- Evaluate brake noises
- Solve brake drag and lock up problems
- Measure brake drums and rotors to determine sources of vibration
- Identify corrective actions as required

III. TOPICS:

1. Explain the construction and operating principles of solid and independent suspension system components.
2. Dismantle, test and inspect suspension system components.
3. Explain the construction, operating principles, testing and servicing of manual and power steering systems.
4. Explain the purpose and application of alignment angles and measurements.
5. Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve and cables.
6. Diagnose brake system faults following manufacturer procedures.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Automotive Technology First Canadian Edition

Pens, pencils, calculator, 3-ring binder

*shop coat or coveralls

*CSA approved steel toe boots (high top)

*CSA approved safety glasses

*these items mandatory for shop

V. 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 – 60% of the final grade is comprised of term tests.
- Assignments – 10% of the final grade is comprised of a number of technical reports.
- 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	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	
A	80 – 89%	4.00
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.	

VI. SPECIAL NOTES:

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.