

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Suspension, Steering and Brakes Level I

CODE NO. : AST606 **LEVEL:** 1

PROGRAM: Automotive Service Technician Apprenticeship (6067)

AUTHOR: Stephen Kent

DATE: June 09 **PREVIOUS OUTLINE DATED:**

APPROVED:

“Corey Meunier”
CHAIR

DATE

TOTAL CREDITS:

PREREQUISITE(S):

HOURS/WEEK:

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I. 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.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1 *Define the purpose and fundamentals of suspension systems.***Potential Elements of the Performance:**

Explain and describe the following:

- Hook's Law
- center of gravity
- centrifugal force
- torque as applied
- inertia
- levers
- friction
- static
- kinetic
- co-efficient
- sliding & rolling
- characteristics and applications of suspension materials
- spring steel
- tempered steel
- synthetic rubber
- fiber composites
- pneumatics
- hydraulics
- dangers of heating suspension / steering components

2 Explain the construction and operating principles of solid and independent suspension system components.

Potential Elements of the Performance:

- Identify independent suspension systems, short-long arm, twin I beam, McPherson strut and modified strut.
- Compare gas shocks vs. hydraulic.
- Identify load and non-load-carrying ball joints.
- State four types of automotive springs.
- Identify radius and strut rods.
- Define camber, caster and toe.

3 Inspect suspension system components.

Potential Elements of the Performance:

- Inspect control arm bushings.
- Measure vehicle ride height.
- Test shock absorbers.
- Clean, repack and adjust wheel bearings.

4 Explain the construction, operating principles, and servicing of manual steering systems.

Potential Elements of the Performance:

- Identify types of manual steering gears, rack and pinion and recirculating ball.
- Test and inspect steering gear adjustment.
- Dry park steering linkage.
- Lubricate steering components following manufacturers' recommendations.

5 Outline the construction, testing and servicing of tires and rims.

Potential Elements of the Performance:

- Define hydro-planing.
- Explain static and dynamic wheel balance.
- Describe the construction of radial tires.
- Identify factors that offset tire wear.
- Rotate tires following manufacturers' maintenance procedures.
- Repair tires using prescribed tools and supplies.
- Perform dynamic wheel balance using computer assisted balancer.

6 Define the purpose and fundamentals of braking system assemblies.

Potential Elements of the Performance:

- Pascal's Law
- laws of levers, mechanical advantages
- friction
- co-efficient of friction
- brake fluids
- servo-action
- self-energizing
- velocity and acceleration
- torque multiplication
- displacement

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

Potential Elements of the Performance:

- Identify materials used to make brake pads and shoes.
- Describe master cylinders, wheel cylinders and calipers.
- List and describe the three valves in the combination valve.
- Inspect brake lines and flex hoses.
- Inspect parking brake mechanisms to verify operation.
- Measure brake drums and rotors using precision measurement equipment.
- Machine brake disc's and drums.
- Service calipers and drum brake assemblies using proper brake tools and lubricants.

III. TOPICS:

1. Define the purpose and fundamentals of suspension systems.
2. Explain the construction and operating principles of solid and independent suspension system components.
3. Inspect suspension system components.
4. Explain the construction, operating principles, and servicing of manual steering systems.
5. Outline the construction, testing and servicing of tires and rims.
6. Define the purpose and fundamentals of braking system assemblies.
7. Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve and cables.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Automotive Technology – Text & Workbook

Pens, pencils, calculator, 3-ring binder

Items mandatory for Shop:

- shop coat or coveralls
- CSA approved steel toe boots (high top)
- CSA approved safety glasses

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.

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

The following semester grades will be assigned to students:

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

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Prior Learning Assessment:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

Substitute course information is available in the Registrar's office.

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade “C”, (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations, in addition to announcements, news, academic calendar of events, class cancellations, your learning management system (LMS), and much more. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

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.

