

COURSE DESCRIPTION:

In this course, the CICE student will focus on the construction, repair and diagnosis of motive power suspension systems. Common sources of vehicle vibration related to suspension, driveline, and tires will be outlined at this time. Power steering systems and wheel alignment on trucks and cars will also be covered, including diagnostics and repair. Students will be required to follow proper safety procedures when performing the above tasks according to both the Sault College Motive Power Department Standards and Vehicle Manufacturers' safety regulations and specifications.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the CICE student, with assistance from a Learning Specialist, will demonstrate the basic ability to:

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

Potential Elements of the Performance of:

- compare and contrast independent, short-long arm, twin I beam, McPherson strut, and modified strut suspension systems
- evaluate the effectiveness of gas shocks vs. hydraulic shocks
- identify load and non-load-carrying ball joints
- state the four types of springs
- identify radius arms and strut rods

2. Dismantle, test, inspect, and diagnose suspension system components

Potential Elements of the Performance of:

- inspect control arm bushings
- inspect torque rods and bushings
- measure vehicle ride height
- inspect and test shock absorbers
- remove and replace McPherson struts
- remove and replace truck springs
- measure King Pins for maximum wear limits
- remove and replace King Pins
- measure ball joint play using the prescribed measuring equipment
- measure and adjust air ride height
- measure truck spring pin and bushing clearance
- inspect leaf-type suspension systems for broken leaves

3. Explain the construction, operating principles, testing and servicing of manual and power steering systems

Potential Elements of the Performance of:

- **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 how power steering pumps, power gear boxes, and control valves operate**
- **test and inspect a power steering pump for pressure and flow**
- **analyze power steering system operation using the prescribed tools and equipment**

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

Potential Elements of the Performance of:

- **outline the need for wheel alignment**
- **define alignment angle, camber, caster, toe, S.A.I, included angle, set back, and thrust angles**
- **compare alignment types, including geometric center line, 2 wheel thrust line, and total 4 wheel**
- **observe and evaluate the measurement of a vehicle**
- **explain the set up procedure for a 4-wheel alignment machine**
- **describe the 4 methods used to adjust alignment angles, shims, eccentrics, strut rod, and slots**
- **manually measure truck tracking**
- **measure and adjust tandem axle scrub**
- **check front axle setback**
- **diagnose vehicle handling characteristics and alignment related tire wear**

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.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Title: Heavy Duty Truck Systems

Edition: 6th edition, #12959

Author: Bennett

Publisher: Thomson Nelson Learning Canada

Pens, pencils, calculator, 3-ring binder

The following items are mandatory for shop:

- **CSA approved steel toe boots (high top)**
- **CSA approved safety glasses**
- **Approved coveralls**

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 – 35% of the final grade is comprised of term tests**
- **Assignments – 10% of the final grade is comprised of technical reports**
- **Shop – 45% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude**
- **Employability Skills – 10% of final grade is comprised of attendance, class participation, ability to follow direction, and being a team player**

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

NOTE: All assignments will be in typed format. NO hand written assignments will be accepted.

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.

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

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.

A Department Attendance Policy will be discussed.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.

Cell phones are not allowed to be on in the classrooms or shop areas during class time.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.

Addendum:

Further modifications may be required as needed as the semester progresses based on individual student(s) abilities and must be discussed with and agreed upon by the instructor.

CICE Modifications:**Preparation and Participation**

1. A Learning Specialist will attend class with the student(s) to assist with inclusion in the class and to take notes.
2. Students will receive support in and outside of the classroom (i.e. tutoring, assistance with homework and assignments, preparation for exams, tests and quizzes.)
3. Study notes will be geared to test content and style which will match with modified learning outcomes.
4. Although the Learning Specialist may not attend all classes with the student(s), support will always be available. When the Learning Specialist does attend classes he/she will remain as inconspicuous as possible.

A. Tests may be modified in the following ways:

1. Tests, which require essay answers, may be modified to short answers.
2. Short answer questions may be changed to multiple choice or the question may be simplified so the answer will reflect a basic understanding.
3. Tests, which use fill in the blank format, may be modified to include a few choices for each question, or a list of choices for all questions. This will allow the student to match or use visual clues.
4. Tests in the T/F or multiple choice format may be modified by rewording or clarifying statements into layman's or simplified terms. Multiple choice questions may have a reduced number of choices.

B. Tests will be written in CICE office with assistance from a Learning Specialist.***The Learning Specialist may:***

1. Read the test question to the student.
2. Paraphrase the test question without revealing any key words or definitions.
3. Transcribe the student's verbal answer.
4. Test length may be reduced and time allowed to complete test may be increased.

C. Assignments may be modified in the following ways:

1. Assignments may be modified by reducing the amount of information required while maintaining general concepts.
2. Some assignments may be eliminated depending on the number of assignments required in the particular course.

The Learning Specialist may:

1. Use a question/answer format instead of essay/research format
2. Propose a reduction in the number of references required for an assignment
3. Assist with groups to ensure that student comprehends his/her role within the group
4. Require an extension on due dates due to the fact that some students may require additional time to process information
5. Formally summarize articles and assigned readings to isolate main points for the student
6. Use questioning techniques and paraphrasing to assist in student comprehension of an assignment

D. Evaluation:

Is reflective of modified learning outcomes.