

I. COURSE DESCRIPTION:

In this course, the CICE student will be introduced to manual transaxles and front wheel drive axle assemblies. The CICE student, with assistance from a Learning Specialist, will disassemble and reassemble manual transaxles and CV shafts. Automatic transmissions will be introduced to the CICE student, with a focus on pump types, valves, torque converters, driving and holding devices, and planetary gear sets (both simple and compound). He/she will disassemble and trace power flows through automatic transmissions, and perform pressure tests. The CICE student will be introduced to four wheel drive and all-wheel drive systems, with a focus on construction and operation.

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. *Explore the functions, constructions, types, styles and applications of front wheel drive axle assemblies.*

Potential Elements of the Performance of:

Explore and describe the following:

- front wheel drive axles
- half shafts
- constant velocity
- bearings
- constant velocity (CV) boots
- vibration dampers
- front wheel drive axles
- torque steer
- inner and outer constant velocity joints
- vibration damper operation

2. *Explore the construction and operation of manual transaxles.*

Potential Elements of the Performance of:

- review the similarities and differences between front wheel drive vs. rear wheel drive
- trace power flows through a transaxle

- identify the operation of synchronizer hub assemblies
- outline shift mechanisms
- perform the disassembly and inspection of a transaxle, and assist with performing the assigned operations to determine gear ratio and final drive ratio

3. *Explore front wheel drive axle construction and operation.*

Potential Elements of the Performance of:

- identify the difference between a plunge-type and a fixed CV joint
- perform the removal and installation of axle assemblies from a vehicle
- perform the assigned operations to remove CV boots and joints from half shafts
- identify the diagnostic sequence used to determine CV joint failure

4. *Explore the construction and operating principles of automatic transmissions.*

Potential Elements of the Performance of:

- outline clutch pack and band operation
- list the three types of pumps
- outline control devices
- outline a compound planetary gear set
- outline torque converter operation

5. *Explore the special tools required for servicing and repairing automatic transmission equipped vehicles*

Potential Elements of the Performance of:

- identify tools used for transmission repair
- outline how clutch packs are disassembled

6. *Explore the construction, types, styles and application of transfer case assemblies.*

Potential Elements of the Performance of:

- outline shifting
- outline ranges
- outline the internal operation of manual and automatic four wheel drive transfer cases

III. TOPICS

1. Explore the functions, construction, types, styles and application of front wheel drive axle assemblies.
2. Explore the construction and operation of manual transaxles.
3. Explore front wheel drive axle construction and operation.
4. Explore the construction and operating principles of automatic transmissions.
5. Explore the special tools required for servicing and repairing automatic transmission equipped vehicles.
6. Explore the construction, types, styles and application of transfer case assemblies.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Title: Automotive Technology: A Systems Approach

Edition: 3rd Canadian edition

Author: Erjavec

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 – 40% of the final grade is comprised of term tests.
- Assignments – 10% of the final grade is comprised of a number of technical reports or assignments.
- Shop – 50% 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

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	<u>Definition</u>	<i>Grade Point Equivalent</i>
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.**

Addendum:

Further modifications may be required as needed as the semester progresses based on individual student(s) ability. All modifications to evaluation components and/or assessments must be discussed and agreed upon by the instructor and the learning specialist in advanced of assigned competition date

VII. COURSE OUTLINE ADDENDUM:

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

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.