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**I. COURSE DESCRIPTION:**

Brakes for CICE (MPF0122)

This course deals with the study and interrelationship of essential basic fundamentals, composition, construction and operating principles of hydraulic and pneumatic brake systems. With assistance from a Learning Specialist, the CICE student will also inspect and service hydraulic and pneumatic brake assemblies using manufacturer's maintenance procedures.

Students will be required to follow proper safety procedures when performing the above tasks according to both 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 student with the assistance of a Learning Specialist, will demonstrate the basic ability to:

**1. *Define the essential basic information and fundamentals of standard hydraulic and air brake systems.*****Potential Elements of the Performance**

- Pascal's Law, mechanical advantage
- Effect of heat co-efficient of friction
- Brake fluid composition
- Self –energization
- Weight transfer affecting brake designs for light and heavy-duty off road equipment brakes
- Laws of levers
- Pressure volume relationships
- Boyles and Charles law

**2. *Explain the basic function, composition and construction of drum and disc brake system assemblies as applied to hydraulic and air brakes.*****Potential Elements of the Performance:**

- Master cylinder, drum, shoes, wheel cylinders, discs, pads, calipers, lines and hoses
- Slack adjusters
- Air brake chambers
- Control valves
- Lines and hoses
- SAHR

- Multi disc wet brakes
- Driveline brakes
- Parking brakes

**3. Explain the basic principals of operation of drum and disc brake system assemblies as applied to hydraulic and air brakes.**

Potential Elements of the Performance:

- Master cylinder, drums and shoes
- Wheel cylinders, discs, pads ,caliper
- Control devices
- Air supply system and subsystems
- Air brake chambers
- Slack adjusters
- Parking brakes

**4. Identify, inspect and service drum and disc brake system assemblies as applied to hydraulic and air brakes.**

Potential Elements of the Performance:

- Clean, lubricate and adjust hydraulic drum brake assemblies
- Clean, lubricate and adjust air drum and disc brake assemblies
- Inspect and test disc brake assemblies
- Service caliper slides and bushings
- Perform steel brake line fabrication, ISO and double inverted
- Bleed and flush hydraulic brake systems
- Inspect and adjust parking brakes
- Functional tests of air brake supply systems
- Inspect Heavy Duty wet multi disc brake assemblies

**III. TOPICS:**

1. Brake fundamentals
2. Brake components
3. Brake operation
- 4.. Service drum and disc brake system assemblies

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

**Title:** Heavy Duty Truck Systems

**Edition:** 5th ed.,

**Author:** Bennett

**Publisher:** Thomson Nelson Learning Canada

**Title:** Automotive Technology: A Systems Approach

**Edition:** 2<sup>nd</sup> Canadian Ed.

**Author:** Erjavec

**Publisher:** Thomson Nelson Learning Canada

Pens, pencils, calculator, 3-ring binder

The following items are mandatory in the 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 a number 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, show ability to follow direction and being a team player.

(Student 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.**

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

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<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.	

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. *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.**

**COURSE OUTLINE ADDENDUM:****VII.**

The provisions contained in the addendum located 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.