



COURSE OUTLINE: MPT0202 - HYDRAULIC BRAKE SYST

Prepared: George Parsons

Approved: Martha Irwin, Chair, Community Services and Interdisciplinary Studies

Course Code: Title	MPT0202: HYDRAULIC BRAKE SYSTEMS
Program Number: Name	1120: COMMUNITY INTEGRATN
Department:	C.I.C.E.
Semesters/Terms:	21F
Course Description:	<p>In this course, you will focus on the construction, repair and diagnosis of modern Automotive, Heavy Equipment and Truck hydraulic brake systems. Common sources of vehicle brake problems will be outlined at this time. The students in the CICE Program, with the assistance of a learning specialist, will perform system pressure tests to verify proper operation of master cylinders, power brake boosters and brake pressure control valves. The CICE students, with the assistance of a learning specialist, will also learn the construction and operation of modern anti lock brake systems and verify components using scan tools a digital multi meters.</p> <p>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.</p>
Total Credits:	3
Hours/Week:	6
Total Hours:	48
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Essential Employability Skills (EES) addressed in this course:	<p>EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p> <p>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



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Course Evaluation:	<p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p>								
Other Course Evaluation & Assessment Requirements:	<p>The following semester grades will be assigned to students:</p> <p>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</p> <p>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.</p>								
Books and Required Resources:	<p>Automotive Technology: A Systems Approach by Erjavec Publisher: Thomson Nelson Learning Canada Edition: 4th Canadian Edition</p> <p>Heavy Duty Truck Systems by Bennett Publisher: Cengage Learning Edition: 7th</p> <p>Modern Diesel Technology: Heavy Equipment Systems by Huzij/Spino/Bennett Publisher: Cengage Learning Edition: 3rd</p>								
Course Outcomes and Learning Objectives:	<p>Upon successful completion of this course, the CICE student, with the assistance of a Learning Specialist will acquire varying levels of skill development relevant to the following learning outcomes:</p> <table border="1"> <thead> <tr> <th data-bbox="505 1043 802 1078">Course Outcome 1</th><th data-bbox="802 1043 1451 1078">Learning Objectives for Course Outcome 1</th></tr> </thead> <tbody> <tr> <td data-bbox="505 1078 802 1347">1. Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve, power brake boosters and cables.</td><td data-bbox="802 1078 1451 1347"> 1.1 Compare and contrast materials used to make brake pads and shoes. 1.2 Analyze master cylinders, wheel cylinders and calipers to determine operation. 1.3 Test combination valve with pressure gauges to check operation 1.4 Inspect brake lines and flex hoses. 1.5 Analyze parking brake mechanisms to verify operation. 1.6 Describe power brake booster operation, Vacuum and Hydraulic. </td></tr> <tr> <th data-bbox="505 1347 802 1381">Course Outcome 2</th><th data-bbox="802 1347 1451 1381">Learning Objectives for Course Outcome 2</th></tr> <tr> <td data-bbox="505 1381 802 1459">2. Diagnose and repair hydraulic brake system faults following</td><td data-bbox="802 1381 1451 1459"> 2.1 Evaluate brake noises 2.2 Solve brake drag and lock up problems 2.3 Measure brake drums and rotors to determine sources of </td></tr> </tbody> </table>	Course Outcome 1	Learning Objectives for Course Outcome 1	1. Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve, power brake boosters and cables.	1.1 Compare and contrast materials used to make brake pads and shoes. 1.2 Analyze master cylinders, wheel cylinders and calipers to determine operation. 1.3 Test combination valve with pressure gauges to check operation 1.4 Inspect brake lines and flex hoses. 1.5 Analyze parking brake mechanisms to verify operation. 1.6 Describe power brake booster operation, Vacuum and Hydraulic.	Course Outcome 2	Learning Objectives for Course Outcome 2	2. Diagnose and repair hydraulic brake system faults following	2.1 Evaluate brake noises 2.2 Solve brake drag and lock up problems 2.3 Measure brake drums and rotors to determine sources of
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	<p>manufacturer procedures.</p> <p>vibration</p> <p>2.4 Identify corrective actions as required</p> <p>2.5 Verify proper power brake booster operation</p> <p>2.6 Repair and replace brake components as required</p> <p>2.7 Machine brake discs and drums</p> <p>2.8 Service calipers and drum brake assemblies and verify proper operation</p> <p>2.9 Perform automated bleed procedure</p>
Course Outcome 3	Learning Objectives for Course Outcome 3
3. Describe the purpose and fundamentals of hydraulic traction control and anti-lock brake systems.	<p>3.1 Explain velocity and acceleration</p> <p>3.2 Compare and contrast wheel skid to wheel lock</p> <p>3.3 Outline tire coefficient of friction pertaining to stopping and acceleration</p> <p>3.4 Describe predetermined deceleration and accelerations rates</p>
Course Outcome 4	Learning Objectives for Course Outcome 4
4. Describe the construction and operation of hydraulic traction control and anti-lock brake systems.	<p>4.1 Explain accumulator and pump operation</p> <p>4.2 Describe wheel speed sensor location and operation</p> <p>4.3 Compare and contrast one, two, three and four channel systems</p> <p>4.4 Outline the differences between integrated and non-integrated systems</p> <p>4.5 Explain hydraulic modulation</p> <p>4.6 Outline the effects of using different sized tires</p>
Course Outcome 5	Learning Objectives for Course Outcome 5
5. Perform inspection and diagnostic procedures on hydraulic traction control and anti-lock brake systems following manufacturer's recommendations.	<p>5.1 Perform a visual inspection</p> <p>5.2 Scan system and extract data</p> <p>5.3 Retrieve trouble codes</p> <p>5.4 Explain hydraulic system pressure precautions</p> <p>5.5 Test and verify wheel speed sensor operation</p> <p>5.6 Perform automated bleed procedure</p>
Course Outcome 6	Learning Objectives for Course Outcome 6
6. Perform inspection, testing, and diagnostic procedures following manufacturer's recommendations and safe work practices on Heavy Duty Hydraulic brake systems.	<p>6.1 Interpret test results and performance problems</p> <p>6.2 noises</p> <p>6.3 drag or lockup</p> <p>6.4 vibrations</p> <p>6.5 imbalance</p> <p>6.6 Check park brake operation</p> <p>6.7 Disassemble and measure multi disc brake components</p> <p>6.8 Pressure test brake applied pressure</p>
Course Outcome 7	Learning Objectives for Course Outcome 7

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	7. Recommend reconditioning or repairs following manufacturer's recommendations for Heavy Duty Hydraulic brake systems.	7.1 Identify corrective repair actions according to manufacturer's recommended procedures
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Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments	10%
Employability Skills	10%
Shop	45%
Theory Tests	35%

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. 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.

B. 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.

C. 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.

D. Assignments may be modified in the following ways:

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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

E. Evaluation:

Is reflective of modified learning outcomes.

NOTE: Due to the possibility of documented medical issues, CICE students may require alternate methods of evaluation to be able to acquire and demonstrate the modified learning outcomes

Date:

October 31, 2021

Addendum:

Please refer to the course outline addendum on the Learning Management System for further information.

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