

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Hydraulic Brake Systems

CODE NO. : MPT202 **Semester** THREE

PROGRAM: Motive Power Technician - Advanced Repair (4044)

AUTHOR: George Parsons

DATE: September 2012 **PREVIOUS OUTLINE DATED:** June 2011

APPROVED: *“Corey Meunier”*
CHAIR DATE

TOTAL CREDITS: 3 THREE

PREREQUISITE(S): MPF103 & MPF122

HOURS/WEEK: SIX

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**For additional information, please contact Corey Meunier, Chair
School of Technology & Skilled Trades
(705) 759-2554, Ext. 2610**

I. COURSE DESCRIPTION:

In this course, you will focus on the construction, repair and diagnosis of modern motive power Hydraulic brake systems. Common sources of vehicle brake problems will be outlined at this time. The student will perform system pressure tests to verify proper operation of master cylinders, power brake boosters and brake pressure control valves. The student will also learn the construction and operation of modern anti lock brake systems and verify components using scan tools a digital multi meters.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. *Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve, power brake boosters and cables.***Potential Elements of the Performance:**

- Compare and contrast materials used to make brake pads and shoes.
- Analyze master cylinders, wheel cylinders and calipers to determine operation.
- Test combination valve with pressure gauges to check operation
- Inspect brake lines and flex hoses.
- Analyze parking brake mechanisms to verify operation.
- Machine brake disc's and drums.
- Service calipers and drum brake assemblies and verify proper operation.
- Describe power brake booster operation, Vacuum and Hydraulic.

2. *Diagnose hydraulic brake system faults following manufacturer procedures.***Potential Elements of the Performance:**

- Evaluate brake noises.
- Solve brake drag and lock up problems.
- Measure brake drums and rotors to determine sources of vibration.
- Identify corrective actions as required.
- Verify proper power brake booster operation.

3. Describe the purpose and fundamentals of hydraulic anti-lock brake systems.

Potential Elements of the Performance:

- Explain velocity and acceleration.
- Compare and contrast wheel skid to wheel lock.
- Outline tire coefficient of friction pertaining to stopping and acceleration.
- Describe predetermined deceleration and accelerations rates.

4. Describe the construction and operation of hydraulic anti-lock brake systems.

Potential Elements of the Performance:

- Explain accumulator and pump operation.
- Describe wheel speed sensor location and operation.
- Compare and contrast one, two, three and four channel systems.
- Outline the differences between integrated and none integrated systems.
- Explain hydraulic modulation.
- Outline the effects of using different sized tires.

5. Perform inspection and diagnostic procedures on hydraulic anti-lock brake systems following manufacturers' recommendations.

Potential Elements of the Performance:

- Perform a visual inspection.
- Scan system and extract data.
- Retrieve trouble codes.
- Explain hydraulic system pressure precautions.
- Test and verify wheel speed sensor operation.

6. Perform inspection, testing, and diagnostic procedures following manufacturers' recommendations and safe work practices on Heavy Duty Hydraulic brake systems.

Potential Elements of the Performance:

Interpret test results and performance problems

- noises
- drag or lockup
- vibrations
- imbalance
- check park brake operation

7. *Recommend reconditioning or repairs following manufacturers' recommendations for Heavy Duty Hydraulic brake systems.*

Potential Elements of the Performance.

- identify corrective repair actions according to manufacturers' recommended procedures

III. TOPICS:

1. Explain the construction and operation of brake lines, cylinders, shoes, pads, drums, discs, combination valve, power brake boosters and cables.
2. Diagnose brake system faults following manufacturer procedures
3. Describe the purpose and fundamentals of anti-lock brake systems.
4. Describe the construction and operation of anti-lock and traction control systems.
5. Perform inspection and diagnostic procedures on ABS systems following manufacturers' recommendations.
6. Perform inspection, testing, and diagnostic procedures following manufacturers' recommendations and safe work practices on Heavy Duty Hydraulic brake systems.
7. Recommend reconditioning or repairs following manufacturers' recommendations for Heavy Duty Hydraulic brake systems.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Automotive Technology First Canadian Edition

Pens, pencils, calculator, 3-ring binder

The following items are mandatory in the 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 – 50% of the final grade is comprised of term tests.
- Assignments – 10% of the final grade is comprised of a number of technical reports.
- Shop – 40% 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)

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.	

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
in the classrooms or shop areas during class time.**

VII. COURSE OUTLINE ADDENDUM:

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

**Professor Parsons
Student Assessment Procedure
for
Motive Power Technician**

THEORY ASSIGNMENTS

Theory assessment is based on regularly scheduled tests and assignments and final exam. Attendance and homework checks are recorded and used as an aid for counseling.

The following grades will be assigned for Theory Assignments:

A+	90 to 100
A	85
A-	80
B +	79
B	75
B-	70
C +	69
C	65
C-	60
D	50
F (Fail)	49 or less

Assignments will be graded as follows:

- a) One day after the original due date – 70% maximum.
- b) Two or more days after the original due date – 50% maximum.

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

Professor Parsons Motive Power Program

Policies and Procedures

1. During your program, you are considered to be a member of the Motive Power Department. As such, your actions and behavior, both in the college and the community reflect on this Department. We trust that your influence will be positive.
2. College policy prohibits the consumption of food and drink in the classrooms and shop. Smoking is allowed only outside of the building in designated smoking areas. No smokeless tobacco is allowed in theory class or shop class.
3. CSA approved Safety Glasses and Safety Boots must be worn in the Shop at all times. This means going to and from all of the classrooms located in the shop. It is the responsibility of the STUDENT to wear them. You will be marked absent if the aforementioned policy is not adhered to.
Note; All safety glasses and boots must meet Sault College CSA approval rating.

NO GLASSES-NO BOOTS-NO ENTRY!!.

4. **SAFETY**
 - 4.1 Students must not enter the shop area or commence work before their scheduled time.
 - 4.2 Students must not work alone or in an unsupervised area.
 - 4.3 Students must have lift truck training prior to operating those units.
 - 4.4 Students must have equipment training and Technologist/Professor approval before operating any equipment.
 - 4.5 Students must not use or operate equipment that is found to be unsafe or damaged. All such equipment must be reported to the Professor or Technologist who will replace and/or repair the said equipment.
 - 4.6 Where damaged or unsafe equipment cannot be repaired or replaced, the Professor/Technologist will provide students alternate shop activity.
 - 4.7 Students must follow instructions and safe work practices in order to use or operate any shop equipment.

5. Repairs to your private vehicles in our facilities can be educational to you. We will accommodate you if the work is part of our program and schedules in. No car should be parked in the shop compound or outside a shop door without staff permission and a temporary parking pass clearly displayed.

6. Attendance – if late, don't bother coming until the next class, you will be marked absent. The student is to be continuously present and actively participating during all scheduled theory and shop classes (scheduled breaks accepted).

6.1 A terminal objective of the Motive Power Department is the demonstration of satisfactory attendance and punctuality performance that the Motive Power Industry, itself, relies on, for efficiency, productivity and profitability.

6.2 If you are marked absent, and no reasonable excuse is given your absence will be termed unexcused (See 18 below). There should NOT be a reason to NOT let us know nor related subject Professors, in writing why you're absent.

6.3 Students will lose marks from their theory and shop mark grade for unexcused absences. Poor attendance can mean a repeat of both theory and shop courses if your employment skills are poor. This is based on what is considered: Employability Skills.

6.4 At 10% of accumulated hours of unexcused absence you will be asked to a scheduled meeting with your Professor and will be asked to sign a contract enabling you to continue the course.

6.5 If you are absent from class, the lesson material is your responsibility.

7. **BEHAVIOR/ATTITUDE**

7.1 Students are required to:

- a) Properly care for and maintain all shop and classroom equipment.
- b) Properly clean the shop/classroom facility and equipment at the end of each class.
- c) Remain in the class during clean-up and assist in the cleaning and shutting down of their shop/classroom.

7.2 Students are expected to conduct themselves in a manner that does not interfere with or obstruct the overall learning environment.

- 7.3 The following activities are not allowed in the shop/classrooms:
- a) Horseplay.
 - b) Making unnecessary noise.
 - c) Swearing.
 - d) Abusive behavior.
- e) Smoking, chewing smokeless tobacco, beverages and eating.

8. ASSIGNMENTS AND THEORY TESTS

8.1 Students are required to hand in assignments or write theory tests on the day and at the time specified/scheduled. See item #18 in the aforementioned document.

8.2 Assignments will be graded as follows:

- a) One day after the original due date – 70% maximum.
- b) Two or more days after the original due date – 50% maximum.

NOTE: The only exception of Policy # 8 shall be those arising from personal emergencies (i.e. car accident, family death, serious illness, employment reasons) and the student supplies a written statement to that effect. See item #18.

9. Please, coffee breaks only 10 to 12 minutes MAXIMUM. NOTE: Individual Professors will address each class with their expectations. Some may only allow 10 minutes.

10. Please refrain from loitering in “C” wing hallways, around shop hallway entry doors and outside entrance doorways/walkways.

11. Being under the influence of alcohol or drugs during any shop or theory class will not be tolerated and the student will be excused from class at the Professor’s discretion.

12. Please remember that you must attend all related subject areas and pass successfully to obtain a Certificate or Diploma.

13. If you miss a test with an “unexcused absence” (as deemed legitimate by your professor) you will NOT be allowed to write that test. Only if; a doctor’s note, airline ticket, etc., or circumstances arising from a family emergency; and legitimate written proof can be presented to the professor. See item number 18 below for clarification.

14. If a class is missed or going to be missed it is your responsibility to notify in writing (see item #18 below) your Professor and make arrangements for handouts and notes taken while you are away.

15. The use of Lap Tops, cell phones/PDA's, electronic information/image capturing, recording device for any form of communication or recording (voice, text, recording, image, etc...) during theory class or shop is strictly prohibited. Cell phones/PDA's must be silenced during regular class and shop times and must be turned off and kept out of sight during all classes and test sittings. Failure to follow the latter requirement during a test sitting will result in a grade of 0 (zero) being assigned and if not out of sight or being used during class, the unit WILL be confiscated for the duration of the class.

NO EXCEPTIONS

16. Students may not wear earphones/headphones of any kind (i.e. for playback of recorded music/voice) during theory classes, shop classes and test sittings. This does not include hearing aids as required by hearing impaired students.

17. NO Lap Top Computers will be allowed in any class unless proper documentation is provided that the computer is required for learning assistance.

18. Any request to deviate from the aforementioned course outline requirements must be made to the Professor in writing or via Sault College email. If permission is granted it must also be granted in writing or via Sault College email. Verbal requests/permissions are not acceptable. It is the student's responsibility to maintain a copy of all such requests and associated permissions.

Student

Signature: _____

Date: _____

Students refusing to sign this form will not be allowed to register or continue in their course.