



**I. COURSE DESCRIPTION:**

Upon successful completion of this course, Fundamentals of Fluid Power Systems, you will be able to perform basic calculations of pressure, force and area using Imperial and System International (S.I.) measurement, be able to interpret basic hydraulic systems schematics and symbols, explain the operation of hydraulic components and be able to describe the different types of hydraulic fluids and their applications. The student will also be able to describe the inspection and testing procedures for hydraulic conductors and fittings and describe a regular scheduled maintenance service following manufacturer's recommendations. The student will also be able to locate and identify the major components of a hydraulic system and perform leak and pressure tests.

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 will demonstrate the ability to:

**1. *Explain the fundamentals of hydraulic systems.***

- Pascal's Law
- Boyle's Law
- Charles's Law
- Gay-Lussac's Law
- Bernoulli's Principle

*Describe hydraulic terms and applications.*

- Hydrostatics
- Hydrodynamics
- Positive and negative pressures
- Fluid power leverage

*Perform calculations for pressure, force and area using the following systems:*

- Imperial
- system international unites (s.i.)

**2. Identify the components and graphic symbols.**

- reservoir (filters and lines)
- pumps and compressors
- valves (pressure, volume and directional control)
- actuators (rotary and linear)

*Describe the features, composition, types, and application of schematics for hydraulic systems.*

- explain and interpret manufacturer's schematic legends

*Perform basic circuit drawings using graphic symbols.*

**3. Explain the fundamentals of hydraulic components.**

*Pumps*

- gear
- vane
- piston
- pressure relief valves
- directional control valves
- volume control valves
- linear actuators
- rotary actuators
- vented and pressurized reservoirs

*Identify the construction features, types, and styles of hydraulic components.*

- gear pumps
- vane pumps
- piston pumps
- pressure relief valve
- directional control valve
- volume control valve
- linear actuators
- vented and pressurized reservoirs

*Describe the principles of operation of hydraulic components.*

- gear pumps
- vane pumps
- piston pumps
- pressure relief valve
- directional control valve
- volume control valve
- linear actuators
- vented and pressurized reservoirs

*Identify and locate hydraulic components on basic systems using schematics, physically on a piece of equipment.*

**4. Explain the purpose and fundamentals of hydraulic fluids pertaining to:**

- power transfer medium
- lubrication
- cooling

*Identify the composition and properties of hydraulic fluids pertaining to:*

- viscosity
- fire supporting ( volatility and flammability )
- fire retarding

*Describe the function and construction features of hydraulic fluid filters.*

- surface types
- depth types

**5. Explain the purpose of hydraulic conductors and connectors including lines, pipes, fittings and hoses and tubing.**

*Identify the construction features, types, and application of conductors and connectors.*

- Standard, British and Metric fitting

*Demonstrate the fabrication, inspection, and testing procedures following manufacturers' recommendations for hydraulic conductors and connectors.*

- identify the risks of fluid injection into the skin

**6. Explain the fundamentals of regular hydraulic system maintenance service.**

*Demonstrate maintenance procedures following manufacturers' recommendations for hydraulic systems.*

**III. TOPICS:**

1. Fluid Power Fundamentals
2. Fluid Power Component and Graphic Symbols
3. Fluid Power Principles of Operation
4. Fluid Power Hydraulic Fluids and Filters
5. Fluid Power Conductors and Connectors
6. Fluid Power Maintenance Schedule

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

**Title:** Heavy Duty Truck Systems

**Edition:** 6th ed.,

**Author:** Bennett

**Publisher:** Thomson Nelson Learning Canada

Additional handouts may be supplied also.

Pens, pencils, calculator, 3-ring binder  
Coloured pencils required, red, blue, green, yellow

**ITEMS MANDATORY FOR SHOP**

\*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 – 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.**

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.	

## 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.***

## VII. COURSE OUTLINE ADDENDUM:

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