# SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

## SAULT STE. MARIE, ONTARIO

## CICE COURSE OUTLINE

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| **COURSE TITLE:** | Fluid Power Systems |
| **CODE NO. :** | MPF125 **SEMESTER:** Winter |
| **MODIFIED CODE:** | MPF0125 |
| **PROGRAM:** | Motive Power Technician – Advanced Repair<br>Motive Power Fundamentals – Automotive Repair<br>Motive Power Fundamentals – Heavy Equipment & Truck Repair |
| **AUTHOR:** | George Parsons |
| **MODIFIED BY:** | Shirley Timmermans, Learning Specialist CICE Program |
| **DATE:** | Jan/2016 **PREVIOUS OUTLINE DATED:** 2015 |
| **APPROVED:** | "Angelique Lemay" Jan/2016 |
| | **DEAN** **DATE** |
| **TOTAL CREDITS:** | 1 |
| **PREREQUISITE(S):** | MPF0103 |
| **HOURS/WEEK:** | 4 |

## I. COURSE DESCRIPTION:

**Fluid Power Systems for CICE (MPF0125)**

Upon successful completion of this course, the CICE student, with assistance from a Learning Specialist, 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 and pneumatic system schematics and symbols, be able to explain the operation of basic hydraulic and pneumatic components, be able to describe the different types of hydraulic fluids and their applications, be able to describe the inspection and testing procedures for hydraulic and pneumatic conductors and fittings, be able to describe a regularly scheduled maintenance service all following manufacturers' recommendations for hydraulic and pneumatic systems, government regulations and safe work practices.

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 CICE student, with the assistance of a Learning Specialist will demonstrate the basic 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 pipes 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:

| 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 |

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|---|---|
| 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.***

## VII. COURSE OUTLINE ADDENDUM:

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.