

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: HYDRAULICS/PNEUMATICS SYSTEMS
CODE NO. : MCH258 **SEMESTER:** 3
PROGRAM: Mechanical Engineering Technician - Manufacturing
AUTHOR: Cam Pucci – cam.pucci@saultcollege.ca
DATE: September 2013 **PREVIOUS OUTLINE DATED:** September 2012
APPROVED:

“Corey Meunier”

CHAIR

DATE

TOTAL CREDITS: 4

PREREQUISITE(S): n/a

HOURS/WEEK: 4

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I. COURSE DESCRIPTION:

This course will cover Hydraulics and Pneumatics. On completion of the course, the student will understand basic hydraulic/pneumatic theory. Discussion will include advantages, design, safety, servicing, replacing parts, conducting lines, proper installation, functions of fluids, and troubleshooting. Reservoirs, filters, pumps, valves, motors, actuators, accumulators and other various equipment will be discussed. The student will be able to design, draw and assemble schematic circuits using Vickers' trainers and the Lab-Volt computerized simulators. Modern testing equipment will be used to test circuits and valves.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. *Discuss the physical laws and concepts dealing with hydraulics and pneumatics.*

Potential Elements of the Performance:

- Pascal's Law - force / area / pressure
- Conservation of Energy Law
- Boyle's Law
- Bernoulli's Law
- Bramah's design
- Laminar / turbulent flows
- Gauge / atmospheric pressures
- Basic design calculations
- Velocity characteristics
- Discuss aeration, cavitation, pump flow

2. *Outline the advantages of hydraulics*

Potential Elements of the Performance:

- Compare hydraulics to other sources
- Understand why hydraulics is used today

3. *Be knowledgeable in the safety measures used in hydraulics*

Potential Elements of the Performance:

- List proper safety measures to be used when servicing hydraulics/pneumatics systems
- Understand how to adjust valves using safe practices
- Be able to safely replace components on a any system using safe work practices
- Understand safe lock out practices for systems
- Understand the dangers involved in various types of high pressure hydraulics

4. *Types of hydraulic and pneumatic conductors used today*Potential Elements of the Performance:

- Discuss various types of steel piping and fittings used in hydraulics
- Discuss various types of tubing and fittings used today
- Discuss hydraulic hoses used
- Discuss sizing, grade, strength, and safety rating of each type of conductor
- Discuss proper installation techniques for each type of conductor

5. *Hydraulic Fluids*Potential Elements of the Performance:

- Understand the functions of fluids in hydraulic systems
- Be knowledgeable of the various types of hydraulic fluids used and why
- Understand basic fluid conditioning monitoring needed
- Discuss proper filtering methods and ratings used today
- Discuss proper testing methods available today

6. *Hydraulic and Pneumatic Components / Accessories*Potential Elements of the Performance:

Discuss various hydraulic components, and their purpose in hydraulic systems such as:

- Reservoirs
- Pumps/Compressors
- Filters
- Directional valves
- Relief valves
- Pressure valves
- Actuators
- Accumulators and other system accessories

7. *Systems*Potential Elements of the Performance:

- Be able to draw, and hook up various circuits on the Vickers's trainers in the Lab as assigned.
- Simulate circuits using Lab-Volt computerized programs
- Perform basic troubleshooting on the Trainers as assigned
- Be able to perform basic preventative maintenance measures

III. TOPICS:

1. Physical laws and concepts dealing with hydraulics/pneumatics
2. Advantages of hydraulics/comparing pneumatics
3. Safety measures used in hydraulics/pneumatics
4. Conducting lines and fittings
5. Hydraulic fluids
6. Components and accessories/Lab-Volt/Vickers Trainers
7. Systems and troubleshooting/Lab-Volt/Vickers Trainers

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Millwright manual, Eaton or Vickers Hydraulic manual, handouts, safety glasses, lab coat, calculator

(student must access Lab-Volt simulators on school computers)

V. EVALUATION PROCESS/GRADING SYSTEM:

Tests 40%

Assignments 40%

Final Exam 10%

Student personal performance 10% consisting of attendance, performance, attitude (Will be explained in detail in class)

Note: 1% of final mark deducted for every inexcusable missed hour of class.

The following semester grades will be assigned to students in postsecondary courses:

Grade	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	
A	80 – 89%	4.00
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 enclosed, 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.