SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: HYDRAULICS/PNEUMATICS SYSTEMS

CODE NO. : MCH258 **SEMESTER:** 2

PROGRAM: MECHANICAL PROGRAMS

AUTHOR: Cam Pucci – cam.pucci@saultcollege.ca
campucci@shaw.ca

DATE: Jan/08 **PREVIOUS OUTLINE DATED:** Jan/07

APPROVED:

_____ _____
CHAIR **DATE**

TOTAL CREDITS: 4

PREREQUISITE(S): n/a

HOURS/WEEK: 4

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, 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 20%
Marks will be deducted from each student for each class missed. All labs must be completed before any final mark is given.

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

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

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:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Retention of Course Outlines:
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Communication:
The College considers ***WebCT/LMS*** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the ***Learning Management System*** communication tool.

Plagiarism:
Students should refer to the definition of "academic dishonesty" in *Student Rights and Responsibilities*. Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:
The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.