

This course introduces the basic principles of fluid mechanics and the application of these principles to practical and applied problems. After completing this course the student should have a firm foundation in the field to continue learning. This course will provide the understanding of basic concepts of fluid mechanics and application of these concepts to solve real world problems in the area of Instrumentation, Process Control and fluid systems.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. ***Perform unit conversions***

Potential Elements of the Performance:

- Define the terms fluids and fluid mechanics
- Derive units of force, energy and pressure in SI and English systems of units
- Perform unit conversions and calculations

2. ***Define, express and relate the properties of fluids and its laws***

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

3. ***Describe basic uses of fluids/gases through hydraulic/pneumatics systems***

Potential Elements of the Performance:

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

4. ***Be knowledgeable in the safety measures used in fluid systems such as hydraulics and pneumatics***

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

5. *Understand basic system components*Potential Elements of the Performance:

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

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

6. *Apply the principles of fluid mechanics*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

7. *Identify factors affecting fluid flow and compute the head loss in a fluid flow system.*Potential Elements of the Performance:

- Characterize laminar flow and turbulent flow
- Understand frictional head loss
- Understand losses due to expansion, contraction and fittings
- Understand total losses and use this in the general energy equation

8. *Perform related lab activities***III. TOPICS:**

1. Systems of Units
2. Fluid Properties
3. Fluid /Gas function
4. Safety measures
5. Various components
6. Apply the principles of fluid mechanics
7. Energy Losses
8. Lab activities

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- Hydraulics - Course Manual, Sault College
- Pneumatics manual...to be announced
- Instrumentation Lab Manual and Assignments

V. EVALUATION PROCESS/GRADING SYSTEM:

The final grade will be derived from the results of the tests and labwork and assignments, weighted as follows:

Tests - 60%
 Assignments/Lab Work - 30%
 Performance/attitude/attendance/.....10%

The following semester grades will be assigned to students:

Grade	Definition	Grade Point Equivalent
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.	

UPGRADING OF INCOMPLETES

When a student's course work is incomplete or his/her final grade is below 50%, there is the possibility of upgrading his/her grade if the student meets all of the following criteria:

1. The student's attendance has been satisfactory.
2. An overall average of at least 50% has been achieved.
3. The student has not had a failing grade in all of the theory tests taken.
4. The student has made reasonable efforts to participate in class and complete assignments.

The nature of the upgrading requirements will be determined by the instructor and may involve one or more of the following: completion of existing labs and assignments, completion of additional assignments, re-testing on individual parts of the course or a comprehensive test on the entire course.

LABS:

Lab activities represent a very important component of this course. Because of this, **attendance is mandatory** and the evaluation of all lab work will be done in class. *It is the student's responsibility to discuss absences from regularly scheduled labs with the instructor so that alternate arrangements (where possible) can be made to complete the lab requirements.*

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 Code of Conduct*. 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.

Attendance:

Absenteeism will affect a student's ability to succeed in this course. Absences due to medical or other unavoidable circumstances should be discussed with the instructor.

VII. PRIOR LEARNING ASSESSMENT:

Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. ADVANCE CREDIT TRANSFER:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.

