



**I. COURSE DESCRIPTION:**

Upon completion the apprentice is able to: identify and describe the operation of pressure, level and flow devices, draw basic process and instrument diagrams using standard ISA symbols; explain the operation and application of typical level and flow measurement devices and transmitters; demonstrate the hydrostatic pressure principle of liquid level measurement; predict with calculations the effect of liquids of different specific gravities on the system; demonstrate the use of the venturi and the orifice plate in flow measurement

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

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

1. ***Describe the concept of direct and indirect measurement***
2. ***Describe the concept and operation of level sensing elements including float. Switches, point contact, sight glass, capacitance devices, ultrasonic, radiation and bubblers***
3. ***Draw basic process diagrams according to ISA standards***
4. ***Determine the outputs of various level measuring devices***
5. ***Explain the concept of weight, mass density and specific gravity.***
  - Describe the concept of hydrostatic and determine the pressure exerted by a column of fluid
  - Connect and test a system to measure the hydrostatic pressure
  - Describe the concept of fluid flow
  - Identify and describe the operation of various flow sensing elements including rotameter, venturi, and orifice plate.
  - Draw basic P&I diagrams for flow measurement using standard ISA instrumentation symbols
  - Determine the output of various flow meters
  - Demonstrate flow devices by connecting and testing differential pressure transmitters
  - Explain the operation of voltage and current instrumentation loops.
  - Install, connect, zero, and span an instrumentation control loop.
  - Explain the purpose of shielded cable in instrumentation and demonstrate the proper shield grounding techniques.
  - Explain the operation of intrinsic safety barriers.
  - Describe the operation of load cells and their applications.

**III. TOPICS:**

1. Pressure
2. Hydrostatic Pressure
3. Gas pressure
4. Level
5. Flow elements
6. ISA Standard Symbols

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

***Labvolt Instrumentation Training Manual*** by Sault College

**V. EVALUATION PROCESS/GRADING SYSTEM:**

**Theory = 35% - 2 tests**

**Labs – 30%-**

**Practical Test 30%**

**Assignments and quizzes 5%**

**Note : The student must pass both the theory portion and the lab practical test portion of the course to pass**

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<b><i>Grade Point Equivalent</i></b>
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.

**VII. COURSE OUTLINE ADDENDUM:**

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