

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Instrumentation II

CODE NO. ELR722 **SEMESTER:**

PROGRAM: Construction & Maintenance Electrician - Intermediate

AUTHOR: Frank Musso

DATE: January **PREVIOUS OUTLINE DATED:**
2009

APPROVED: "Corey Meunier"
CHAIR DATE

TOTAL CREDITS:

PREREQUISITE(S):

HOURS/WEEK:

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For additional information, please contact Corey Meunier, Chair
School of Technology & Skilled Trades
(705) 759-2554, Ext. 2610

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; install connect and test load cells in typical weight measurement applications

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Explain instrument terminology –accuracy, zero, span, repeatability, dead time. Calibrate, linearity, transducers
2. Describe the concept of direct and indirect measurement
3. Describe the concept and operation of level sensing elements including float. Switches, point contact, sight glass, capacitance devices, ultrasonic, radiation and bubblers
4. Draw basic process diagrams according to ISA standards
5. Determine the outputs of various level measuring devices
6. Explain the concept of weight, mass density and specific gravity
7. Describe the concept of hydrostatic and determine the pressure exerted by a column of fluid
8. Connect and test a system to measure the hydrostatic pressure
9. Describe the concept of fluid flow
10. Identify and describe the operation of various flow sensing elements including rotometer, venturi, and orifice plate.
11. Draw basic P&I diagrams for flow measurement using standard ISA instrumentation symbols

12. Determine the output of various flow meters
13. Demonstrate flow devices by connecting and testing differential pressure transmitters
14. Explain the operation of voltage and current instrumentation loops.
15. Install, connect, zero, and span an instrumentation control loop.
16. Explain the purpose of shielded cable in instrumentation and demonstrate the proper shield grounding techniques.
17. Explain the operation of intrinsic safety barriers.
18. 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

Reference Text:

Industrial Control Electronics: Devices, Systems & Applications
by Bartlet

V. EVALUATION PROCESS/GRADING SYSTEM:

Theory = 50% - 3 tests

Labs – 50% - Calibrations – Bubbler System – Flow Loops – Final Project.

The following semester grades will be assigned to students:

Grade	Definition	<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:

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services 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.

VII. PRIOR LEARNING ASSESSMENT:

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.

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