SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE:	Instrumentation III		
CODE NO.	ELR822	**SEMESTER:**	
PROGRAM:	Construction & Maintenance Electrician Advanced Apprenticeship		
AUTHOR:	Frank Musso		
DATE:	January 2012	**PREVIOUS OUTLINE DATED:**	March 2011
APPROVED:	*"Corey Meunier"*		
	CHAIR		**DATE**
TOTAL CREDITS:			
PREREQUISITE(S):			
HOURS/WEEK:			

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

I. COURSE DESCRIPTION:

Upon successful completion of Instrumentation –3.05, the apprentice is able to: describe the use and list the requirements for instrumentation air supplies: explain the terminology of instrumentation systems: describe the operation and application of proportional 3-15 pneumatic systems: connect and adjust pneumatic control valves to I/P: calibrate typical pneumatic valves: explain the principles of On/Off control: identify the four basic elements of control: explain automatic control: Explain the operation and application of position measurement devices: Explain the principles of PID control: Revise and explain loops on instrumentation drawings.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Explain the principles of measured variable vs controlled variable, Feed back, open loop vs. closed loop, transducers

2. Describe the use of and list requirements for instrumentation air supplies.

3. Describe the construction and application of mechanical and electrical operated valves

4. Identify the ISA and European symbols used for pneumatic control devices

5. Describe the theory of operation and the typical application of proportional 3-15 psi pneumatic instrumentation systems

6. Calibrate typical pneumatic valves

7. Explain the operation and application of typical position measurement devices found in industry including shaft encoders, resolvers, proximity switches, LVDTs, and synchros

8. Explain the principles of PID control

9. Connect and test PID controlled process to demonstrate the effects of varying P,I and D.

10. Revise and explain control loops on instrumentation drawings using ISA standards

III. TOPICS:

1. Control Elements
2. PID Tuning
3. Types of controls
4. Pneumatic Systems
5. Valves
6. ISA and European Standards

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Lab Volt Process Control Training Manuals

V. EVALUATION PROCESS/GRADING SYSTEM:

Theory = 34% - 3 tests
Labs written portion– 33%
Labs Practical tests – 33%- minimum 2 practical tests
The controller – Hooking up and tuning control loops – Calibration of I/p and transmitters - Checking pneumatic valves – Cascaded controls – Bubbler system – Multi loop control

The following semester grades will be assigned to students:

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:

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.

Labs

1) Attendance to scheduled lab activities is compulsory, unless permission has been granted by the instructor.

2) Lab attendance and final grade are directly related. If a student arrives late for, or is not continuously present and actively participating at (scheduled breaks excepted), a scheduled lab class he/she will be considered absent for the entire class and will not be permitted to submit the associated lab report.

3) Students must continuously wear all Sault College required personal protective equipment (PPE) during lab activities. Failure to do this will result in expulsion from the lab activity and a grade of zero being assigned. All instrumentation labs required safety glasses and safety boots. (hard toes and shank with ohms tag)

4) If a student repeatedly neglects to wear PPE as required he/she will be considered to be in violation of the Sault College Academic Code of Conduct and may be sanctioned accordingly (see Student Code of Conduct & Appeal Guidelines).
First violation, verbal warning, second violation written warning, third violation suspension from lab activities
Students must complete a lab safety orientation prior to participating in lab activities

5) Successful completion of this orientation will be demonstrated by the student completing a quiz with a minimum grade of 100%.

6) All labs must be demonstrated to the instructor and signed off by the instructor before they are dismantled.

7) All lab reports are to be computer generated. Hand written reports will not be accepted.

8) All lab reports are to include a title page with the following information in the following sequence:

- Lab title, name and number
- Due date
- Date submitted
- Course number
- Names of group members
- Instructor's name

9) Lab reports are to include all procedures, observations and questions listed in the order they appear in the lab handout and numbered to match the lab handout

10) Maximum 2 members per group unless approved by the instructor. One lab report per group will be accepted. The instructor may ask for a separate report from each member of a group.

Lab Reports

Lab reports are due at the beginning of class, 1 week after the scheduled period in which it was done. A ***penalty of 10% per day*** will be assessed for late submissions. It is recommended students submit lab reports prior to the deadline to avoid late submissions due to unforeseen circumstances (i.e. bad weather, transportation problems…).
Students are not permitted to work on live equipment outside of regular class time and may not work in the lab without faculty permission. This permission will not be considered outside of the regular 8:30am to 4:30pm, Monday – Friday time period.
Students must supply their own personal protective equipment (PPE). Students will not be permitted in the lab if not wearing required PPE. Students must never work alone in the lab. Unsafe work habits will not be tolerated.
Students are expected to maintain a clean and organized work area. Failure to put away equipment (in assigned location) and to clean up after a lab activity will result in a ***penalty of 10%***.