

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: INSTRUMENTATION/PROCESS CONTROL

Code No.: ELN 229-4

Program: ELECTRICAL/ELECTRONIC TECHNICIAN

Semester: FOUR

Date: JANUARY 1986

Author: ROB PALO

New: \_\_\_\_\_ Revision: X

APPROVED: *R.P. Crozitto* \_\_\_\_\_  
 Chairperson Date

CALENDAR DESCRIPTION

INSTRUMENTATION/PROCESS CONTROL  
Course Name

ELN 222-4  
Course Number

PHILOSOPHY/GOALS:

This course is intended to introduce the Electrical/Electronic Technician to process measurement and control.

GRADING:

1. Written tests are conducted at regular intervals and assigned equal weight. Missed tests are graded zero percent provided a legitimate excuse such as illness can be supported by a doctor's certificate. Comprehensive make-up tests will be conducted at the end of the semester for people with missed tests and legitimate excuses.
2. Grading  
A - 80 - 100%  
B - 66 - 79%  
C - 55 - 65%  
R - Repeat
3. 70% for tests  
30% for labs
4. Lecture and lab attendance are mandatory.

TEXTBOOK(S):

Industrial Solid State Electronics by Timothy J. Maloney

REFERENCE TEXT(S):

Fundamentals of Process Control Theory by Paul W. Murril

COURSE OUTLINE

BLOCK	TOPIC	HOURS
1	Input transducers - measuring devices	6
2	Feedback systems & Servomechanisms	12
3	Final correcting devices and amplifiers	6
4	Nine examples of closed Industrial Systems	6

SPECIFIC OBJECTIVES

BLOCK 1 - INPUT TRANSDUCERS

1. The student shall understand the theory and method of operation for the following:
  - a) Potentiometers
  - b) LVDT's
  - c) Pressure transducers
  - d) Thermocouples
  - e) Thermistors and RTD's
  - f) Photocells and Photo electric devices
  - g) Strain gauge
  - h) Tachometers
  - i) Humidity transducers

BLOCK 2 - FEEDBACK SYSTEMS

1. The student shall be able to describe the principle of operation and predict the behaviour to a step input for the following:
  - a) Open loop systems
  - b) Closed loop systems
  - c) On-off control
  - d) Proportional control
  - e) Proportional plus integral
  - f) Proportional plus integral plus derivative
  - g) Process response

BLOCK 3 - FINAL CORRECTING DEVICES

1. The student shall be able to describe the principle of operation and predict the behaviour of the following devices:
  - a) Solenoid valves
  - b) 2 position electric motor driven valves
  - c) Electropneumatic valves
  - d) Electrohydraulic valves
  - e) Valve flow characteristics
  - f) Relay and contactors
  - g) Thyristors
  - h) Split phase AC motors
  - i) AC servo motors
  - j) Solid state AC servo amps
  - k) DC servo motors
  - l) Amps for DC servo motors

BLOCK 4 - NINE INDUSTRIAL CONTROL SYSTEMS

1. The student shall be able to describe the following control systems:
  - a) Thermistor control of quench oil temperature
  - b) A proportional mode pressure control system
  - c) A proportional plus reset temperature controller with thermocouple I/P
  - d) A strip tension controller
  - e) Edge guide control for a strip recoiler
  - f) An auto weighing system
  - g) A carbon dioxide controller for a carburizing furnace
  - h) Control of relative humidity in a textile moistening process
  - i) A warehouse humidity controller