

PROCESS CONTROL II
COURSE NAME

ELR 212-5
CODE NO.

TOTAL CREDIT HOURS: 90

PREREQUISITE(S): ELR 204-5

PHILOSOPHY/GOALS:

THE STUDENT WILL DEVELOP SKILLS IN THE USE OF COMPUTERIZED CONTROLLERS INTERFACED TO REAL TIME PROCESS CONTROL SYSTEMS BY MAN MACHINE INTERFACES.

THE STUDENT WILL BE ABLE TO DEVELOP, EDIT, AND INTERPRET BASIC PROGRAMMING ON VARIOUS CONTROLLERS.

THE STUDENT WILL ALSO BE ABLE TO TROUBLESHOOT AND MONITOR THE CONTROLLERS THROUGH NETWORKING AND SOFTWARE DEVELOPMENT TOOLS.

THIS COURSE WILL PROVIDE THE STUDENT WITH THE ABILITY TO UNDERSTAND THE ROLE OF THE INSTRUMENTATION TECHNICIAN IN THE CONTROL OF INDUSTRIAL PROCESSES.

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STUDENT PERFORMANCE OBJECTIVES (OUTCOMES) :

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1. TROUBLESHOOT OPEN AND CLOSED LOOP FEEDBACK CONTROL SYSTEMS AND RECOGNIZING THE PROCESS CONTROL SYSTEM COMPONENTS.
2. PROGRAM AND TROUBLESHOOT COMPUTERIZED CONTROLLERS USING A MULTI FUNCTIONAL TERMINAL.
3. DESIGN, COMMISSION AND DOCUMENT A BASIC MMI APPLICATIONS.
4. AUTOTUNE PROCESS CONTROL SYSTEMS WITH TUNNING SOFTWARE.
5. MONITOR PROCESS CONTROL SYSTEMS WITH NETWORKING TOOLS.

TOPICS TO BE COVERED:

1. PROCESS CONTROL THEORY BASICS & TERMINOLOGY.
2. PROCESS TRANSDUCERS AND CONTROL SYSTEM COMPONENTS.
3. AUTOMATED PROCESS CONTROL SYSTEMS.
4. HARDWARE AND SOFTWARE COMPONENTS OF CONTROLLERS.
5. THE LINKAGE OF PROCESS WITH CONTROL INSTRUMENTATION.

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LEARNING ACTIVITIES

REQUIRED RESOURCES

1. PROCESS CONTROL BASICS

- CONTROL TERMINOLOGY
- BLOCK DIAGRAMS
- EVALUATION OF PROCESS CONTROL SYSTEMS
- FEEDBACK
- TYPES OF CONTROL

2. TRANSDUCERS AND CONTROL SYSTEM COMPONENTS

- TRANSDUCERS
- POSITIONING SENSORS
- VELOCITY SENSORS
- PRESSURE SENSORS
- SOUND SENSORS
- FLOWRATE SENSORS
- ELECTROMAGNETIC SENSORS
- TEMPERATURE SENSORS
- LIGHT SENSORS
- SERVOMECHANISM

3. OVERVIEW OF CONTROLLERS

HARDWARE & SOFTWARE

- INTRODUCTION TO CONTROLLERS
- HISTORY & DEFINITION
- CLASSIFICATION OF CONTROLLERS
- MICROS, SMALL, MEDIUM, LARGE
- I/O COMPONENTS
- POWER SUPPLIES
- PROGRAMMING DEVICES
- NETWORKING CONFIGURATION

OVERVIEW OF CONTROLLERS

- HARDWARE
- INTRODUCTION TO CONTROLLER PROCESSOR'S COMPONENTS
- NETWORKING & CONFIGURATION

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LEARNING ACTIVITIES

REQUIRED RESOURCES

3. OVERVIEW OF CONTROLLERS

- SOFTWARE
 - INITIALIZATION
 - OFFLINE PROGRAMMING AND DOCUMENTATION
 - ONLINE PROGRAMMING AND DOCUMENTATION
 - REPORTING MENU
 - UTILITY MENU

4. OVERVIEW OF MMI'S

HARDWARE

- TERMINAL OVERVIEW
- INITIAL DESKTOP SETUP
- TERMINAL CONFIGURATION
- APPLICATION TRANSFER
- RUNNING APPLICATIONS
- TERMINAL INSTALLATION
- NETWORK CONNECTIONS
- TERMINAL TROUBLESHOOTING
- TERMINAL MAINTENANCE

SOFTWARE

- TERMINAL SOFTWARE OVERVIEW
- INSTALLING SOFTWARE
- PLANNING AN APPLICATION
- APPLICATION BASICS
- RUNNING APPLICATIONS
- CREATING WORKING OBJECTS
- ENTERING TAG INFORMATION
- VALIDATING AND TRANSFERRING APPLICATIONS
- MANAGING APPLICATION SCREENS

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METHOD(S) OF EVALUATION

TESTS - TWO WRITTEN TESTS WORTH 50% TOTAL AND A MINIMUM OF 55% ON ALL TWO TESTS COMBINED MUST BE OBTAINED TO ACHIEVE A PASSING GRADE.
(OPTION OF 50% TOTAL FOR FINAL TEST IS RESERVED BY TEACHER AND CLASS)

PROJECTS - ONE MAJOR LAB PROJECT IS WORTH 20%.
- THREE MINOR LAB PROJECTS ARE WORTH 20%.
LAB TESTS - ONE PRACTICAL TEST IS WORTH 10%.

TOTAL 100%

THE GRADING SYSTEM USED WILL BE AS FOLLOWS:

A+ = 90 - 100% A = 80 - 89% B = 70 - 79% C = 55 - 64%

R REPEAT

REQUIRED STUDENT RESOURCES:

TEXT BOOK : 1. APPLIED PROCESS CONTROL INSTRUMENTATION
BY: JEAN POTVIN

2. PROGRAMMABLE LOGIC CONTROLLERS
BY: COLLIN D. SIMPSON

ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE
AUTOMATION LIBRARY IN B104

SPECIAL NOTES:

COURSE ANALYSIS FORM

PROCESS CONTROL II - ELR 212-5

ASSESSMENT PROCESS

- Register at Prior Learning Assessment Office - E1935
- Pay fee at Registrar's Office (For September 1994 this fee is \$55.00)
- Retain receipt
- Prepare for exam
- Present photo ID at exam location
- 4 hour evaluation process

ASSESSMENT TOOLS

- Written Theriacal Test on Automated Control Systems
- Hands On Practical Test with PLC control of automated equipment.

SUPPORTS

- Applied Process Control Instrumentaionts - J. Potvin
- Automated Control Systems and Components - J.R. Casrtens

REQUIREMENTS FOR SUCCESSFUL COMPLETION OF CHALLENGE PROCESS

- 65% on the written and practical tests combined.

A challenge process for this course can be available to learners within a reasonable period of time following a learner's request.

SIGNATURE:

Eno Ludavicius

PROFESSOR

JUNE 1995

DATE

R.P. Orzetta

PROGRAM COORDINATOR OR DEAN

95-07-04

DATE

COURSE ANALYSIS FORM

PROCESS CONTROL II - ELR212-5

LEARNING OUTCOMES	BROAD AREAS OF CONTENT	INDICATION OF SUCCESS
1) Program and Troubleshoot Process controllers.	<ul style="list-style-type: none">- Create and Edit a program in Offline programming mode.- Download and Upload programs in Online programming mode.- Manipulation of I/O Data Tables	In the challenge process to write a program and then download to a controller, and then run the program.
2) Connect a Simple Transducer.	<ul style="list-style-type: none">- Understand Transducer Symbols and read the connecting schematics.	In the challenge process to connect a transducer circuit from a schematic.
3) Program MMI Terminal.	<ul style="list-style-type: none">- Understand MMI hardware and software Configuration.- Understand the operation of terminal Networking to a Process Control Application	In the challenge process to plum a hydraulic circuit from the schematic with electrical controls.
4) Control a process with a PID loop controller.	<ul style="list-style-type: none">- Describe a simple Proportional, Integral, Derivative servo control systems.	In the challenge process to draw a process flow diagram (ie. Loop Diagram) depicting PID control.