



COURSE OUTLINE: ELR212 - PROCESS CONTROL

Prepared: Frank Musso

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	ELR212: PROCESS CONTROL
Program Number: Name	
Department:	ELECT./INSTRUMENTATION PS
Semesters/Terms:	22W
Course Description:	This course is a study of process control systems including: single loop, multi-loop, cascade, ratio, feed forward and boiler control. The student will calibrate, adjust, tune, test and maintain these types of control systems.
Total Credits:	5
Hours/Week:	5
Total Hours:	75
Prerequisites:	ELN229
Corequisites:	There are no co-requisites for this course.
Essential Employability Skills (EES) addressed in this course:	<p>EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p> <p>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>
Course Evaluation:	<p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p>
Other Course Evaluation & Assessment Requirements:	<p>Student must pass both written tests and lab tests to pass the course.</p> <p>Grade</p>

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.



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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.

Books and Required Resources:

Lab Volt Process Control Manual

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
Understand process control terminology and define common Instrumentation terms	<ul style="list-style-type: none">- List the classifications of industrial control systems.- Identify open and closed loop systems.- Recognize and describe controller modes.- Recognize and describe single loop control dynamics.- Explain SAMA and ISA symbols.- Describe the use and list requirements for instrument air supply- Identify pneumatic control systems- Identify Hydraulic control systems- Understand the workings of SLC (Single Loop Controller)
Course Outcome 2	Learning Objectives for Course Outcome 2
Develop an insight into the concepts of tuning feedback controllers	<ul style="list-style-type: none">- Define the basis for tuning automatic controllers.- Review quarter wave amplitude decay.- Describe the Trial and Error Method of controller tuning.- Calculate and apply the tuning parameters for a feedback controller using the Ziegler-Nichols ultimate method.- Understand adaptive controller tuning
Course Outcome 3	Learning Objectives for Course Outcome 3
Understand the basic concepts of cascaded control	<ul style="list-style-type: none">- Understand the basic concept of feedback control- Understand the basic concept of feed-forward control- Explain the general guidelines for cascade controller mode selection.- Draw the block diagram of a cascade system- Identify primary and secondary systems.- Describe function of remote/local transfer.- Configure and tune a cascade system
Course Outcome 4	Learning Objectives for Course Outcome 4
Understand the basic concepts of ratio control.	<ul style="list-style-type: none">- Identify a ratio control system.- Draw the block diagram of a ratio control system.

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	<ul style="list-style-type: none"> - Describe wild and controlled variables. - Calculate loop values for a common flow ratio system. - Configure and tune a ratio control system
Course Outcome 5	Learning Objectives for Course Outcome 5
Understand the basic concepts of feed-forward control	<ul style="list-style-type: none"> - Analyse feed-forward control systems. - Draw the general block diagram of a feed-forward control system. - Identify limitations and problems of feed-forward control systems. - Describe the reasons for feedback trim on a feed-forward system. - Sketch a feed-forward control loop with feedback trim.
Course Outcome 6	Learning Objectives for Course Outcome 6
Understand DCS control systems	<ul style="list-style-type: none"> - Describe the functions of a DCS system - Analyze and troubleshoot DCS analog card - Configure DCS Analog input and output interfacing modules - Configure DCS, PID software advance instructions - Program a DCS to control a single loop process

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments	10%
Labs	20%
Practical Tests	20%
Written Tests	50%

Date: July 30, 2021

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.

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