



COURSE OUTLINE: ELR212 - PROCESS CONTROL

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Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	ELR212: PROCESS CONTROL
Program Number: Name	4104: INST CONTROL ENG TN
Department:	ELECT./INSTRUMENTATION PS
Semesters/Terms:	19W
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:	<div><div>EES 1</div><div>Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</div></div> <div><div>EES 2</div><div>Respond to written, spoken, or visual messages in a manner that ensures effective communication.</div></div> <div><div>EES 3</div><div>Execute mathematical operations accurately.</div></div> <div><div>EES 4</div><div>Apply a systematic approach to solve problems.</div></div> <div><div>EES 5</div><div>Use a variety of thinking skills to anticipate and solve problems.</div></div> <div><div>EES 6</div><div>Locate, select, organize, and document information using appropriate technology and information systems.</div></div> <div><div>EES 7</div><div>Analyze, evaluate, and apply relevant information from a variety of sources.</div></div> <div><div>EES 8</div><div>Show respect for the diverse opinions, values, belief systems, and contributions of others.</div></div> <div><div>EES 9</div><div>Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</div></div> <div><div>EES 10</div><div>Manage the use of time and other resources to complete projects.</div></div> <div><div>EES 11</div><div>Take responsibility for ones own actions, decisions, and consequences.</div></div>
Course Evaluation:	Passing Grade: 50%, D
Other Course Evaluation & Assessment Requirements:	<div>Student must pass both written tests and lab tests to pass the source.</div> <div>Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00</div>



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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 $\frac{1}{s}$ 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. - 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.



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		<ul style="list-style-type: none">- 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 DSC 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	Course Outcome Assessed
	Assignments	10%	
	Labs	20%	
	Practical Tests	20%	
	Written Tests	50%	

Date:	August 20, 2018
	Please refer to the course outline addendum on the Learning Management System for further information.