



COURSE OUTLINE: ELR212 - PROCESS CONTROL

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Course Code: Title	ELR212: PROCESS CONTROL
Program Number: Name	
Department:	ELECT./INSTRUMENTATION PS
Academic Year:	2024-2025
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:	70
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>The student must pass both the theory portion and the lab portion to pass the course.</p> <p>Smart watches, smart phones and similar devices are not allowed during tests or quizzes and</p>



must be removed. Smart phones are not acceptable for use as a calculator during a test or quiz.

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.

Books and Required Resources:

Lab Volt Process Control Training Manual by Sault College
 Publisher: AK Graphics
 LABVOLT ELN229 (Sault Coll)

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Understand process control terminology and define common instrumentation terms.	1.1 List the classifications of industrial control systems. 1.2 Identify open and closed loop systems. 1.3 Recognize and describe controller modes. 1.4 Recognize and describe single loop control dynamics. 1.5 Explain SAMA and ISA symbols. 1.6 Describe the use of and list requirements for instrument air supplies. 1.7 Identify pneumatic control systems. 1.8 Identify hydraulic control systems. 1.9 Understand the workings of SLC (Single Loop Controller).
Course Outcome 2	Learning Objectives for Course Outcome 2
2. Develop an insight into the concepts of tuning feedback controllers.	2.1 Define the basis for tuning automatic controllers. 2.2 Review quarter wave amplitude decay. 2.3 Describe the Trial and Error Method of controller tuning. 2.4 Calculate and apply the tuning parameters for a feedback controller using the Ziegler-Nichols tuning method. 2.5 Understand adaptive controller tuning.
Course Outcome 3	Learning Objectives for Course Outcome 3
3. Understand the basic concepts of cascaded control.	3.1 Understand the basic concept of feedback control. 3.2 Understand the basic concept of feed-forward control. 3.3 Explain the general guidelines for cascade controller mode selection. 3.4 Draw the block diagram of a cascade system. 3.5 Identify primary and secondary systems.

	3.6 Describe function of remote/local transfer. 3.7 Configure and tune a cascade system.
Course Outcome 4	Learning Objectives for Course Outcome 4
4. Understand the basic concepts of ratio control.	4.1 Identify a ratio control system. 4.2 Draw the block diagram of a ratio control system. 4.3 Describe wild and controlled variables. 4.4 Calculate loop values for a common flow ratio system. 4.5 Configure and tune a ratio control system.
Course Outcome 5	Learning Objectives for Course Outcome 5
5. Understand the basic concepts of feed-forward control.	5.1 Analyse feed-forward control systems. 5.2 Draw the general block diagram of a feed-forward control system. 5.3 Identify limitations and problems of feed-forward control systems. 5.4 Describe the reasons for feedback trim on a feed-forward system. 5.5 Sketch a feed-forward control loop with feedback trim.
Course Outcome 6	Learning Objectives for Course Outcome 6
6. Understand the use of automation systems in process control.	6.1 Describe the functions of an automation system in process control applications. 6.2 Configure automation system analog input and output interface modules. 6.3 Analyze and troubleshoot automation system analog modules. 6.4 Configure automation system PID software and other related instructions. 6.5 Program an automation system to control a single loop process.

Evaluation Process and Grading System:

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

Date: January 28, 2025

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