COURSE OUTLINE

ELR212

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Course Code: Title	ELR212: PROCESS CONTROL
Program Number: Name	4104: INST CONTROL ENG TN
Department:	ELECT./INSTRUMENTATION PS
Semester/Term:	18W
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
Essential Employability Skills (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. #2. Respond to written, spoken, or visual messages in a manner that ensures effective communication. #3. Execute mathematical operations accurately. #4. Apply a systematic approach to solve problems. #5. Use a variety of thinking skills to anticipate and solve problems. #6. Locate, select, organize, and document information using appropriate technology and information systems. #7. Analyze, evaluate, and apply relevant information from a variety of sources. #8. Show respect for the diverse opinions, values, belief systems, and contributions of others. #9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. #10. Manage the use of time and other resources to complete projects. #11. Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 50%, D
Other Course Evaluation & Assessment Requirements:	Student must pass both written tests and lab tests to pass the source. 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W Student has withdrawn from the course without academic penalty.

Evaluation Process and Grading System:

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

Books and Required Resources:

Lab Volt Process Control Manual

Course Outcomes and Learning Objectives:

Course Outcome 1.

Understand process control terminology and define common Instrumentation terms

Learning Objectives 1.

- 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.

Develop an insight into the concepts of tuning feedback controllers

Learning Objectives 2.

- Define the basis for tuning automatic controllers.
- Review ¼ 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.
- Calculate and apply the tuning parameters for a feedback controller using the Ziegler-Nichols process reaction method.
- Understand adaptive controller tuning

Course Outcome 3.

Understand the basic concepts of cascaded control

Learning Objectives 3.

- 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.

Understand the basic concepts of ratio control.

Learning Objectives 4.

- 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.

Understand the basic concepts of feed-forward control

Learning Objectives 5.

- 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.

Understand DCS control systems

Learning Objectives 6.

	• 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
Date:	Monday, December 18, 2017
	Please refer to the course outline addendum on the Learning Management System for further information.