# ISET-2511: PROGRAMMABLE LOGIC CONTROLLERS MAINTENANCE II

## Cuyahoga Community College

### Viewing: ISET-2511 : Programmable Logic Controllers Maintenance II

**Board of Trustees:**
January 2023

**Academic Term:**
Fall 2023

**Subject Code**
ISET - Integrated Systems Engineering

**Course Number:**
2511

**Title:**
Programmable Logic Controllers Maintenance II

**Catalog Description:**
Programming and application of Programmable Logic Controllers (PLCs) including program control, data manipulation, math instructions, sequencers and shift registers. Students will be able to describe Installation and networking systems as well as assess proper troubleshooting techniques.

**Credit Hour(s):**
3

**Lecture Hour(s):**
2

**Lab Hour(s):**
2

### Requisites

**Prerequisite and Corequisite**
ISET-2500 Programmable Logic Controllers Maintenance I.

### Outcomes

**Course Outcome(s):**
Given a sequence of operation write a PLC ladder logic program that utilizes advanced instructions including program control, data manipulation, compare, math instruction, sequencers, and shift registers.

**Objective(s):**

a. Demonstrate through programming on a PLC the application of program control instructions.
b. Demonstrate through programming on a PLC the application of data manipulation and compare instructions.
c. Demonstrate through programming on a PLC the application of math instructions.
d. Demonstrate through programming on a PLC the application of sequencer instructions.
e. Demonstrate through programming on a PLC the application of shift registers instructions.

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**Course Outcome(s):**
Explain Installation methods, types of process control capabilities, and communication methods of PLC's.

**Objective(s):**

a. Describe proper PLC installation and maintenance methods including enclosure types, noise, leaky IO, grounding preventative maintenance.
b. Describe different process control, Data communication, and SCADA systems.

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**Course Outcome(s):**

Assess proper editing methods and troubleshooting techniques.

**Objective(s):**

a. Assess proper editing methods.
b. Assess possible faults given certain PLC and system conditions.

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**Methods of Evaluation:**

A combination of exams quiz's and homework.

**Course Content Outline:**

# 1.Program Control Instructions

a. Master Control
b. Jump
c. Subroutine
d. Forcing I/O
e. Temporary End

# 2.Data Manipulation and Compare Instructions

a. Transfer
b. Compare
c. Numerical data interfacing
d. Closed Loop Control

# 3.Math Instructions

a. Addition subtraction
b. Multiplication division
c. Word level math instructions
d. File Arithmetic Operations

# 4.Sequencer and Shift Register Instructions

a. Mechanical Sequencers
b. Sequencer Instructions
c. Sequencer programs
d. Bit shift registers
e. Word shift operations

# 5.PLC installation Practices Editing and Troubleshooting

a. PLC enclosures
b. Lectical noise
c. Leaky inputs and outputs
d. Grounding
e. Program editing and commissioning
f. Preventative maintenance
g. Troubleshooting

# 6.Process Control, Network Systems, and SCADA

a. Types of processes
b. On Off Control
c. PID control

d. Motion control
e. Data communications
f. Supervisory Control and data Acquisition (SCADA)

## Resources

Petruzella,F. *Programmable Logic Controllers*. 6th. Columbus, OH: McGraw-Hill Publishing Company, 2022.

Petruzella, Frank. *LogixPro PLC Lab Manual for Programmable Logic Controllers*. Columbus, OH: McGraw-Hill Publishing Company, 2022.

Herman, Stephan L. *Delmar's Standard Textbook of Electricity*. 7th. Clifton Park NY: Delmar, 2020.

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