

Division: Technical

Subject: ELME

Course: 109

Course Title: Programmable Logic Controllers I

Thaddeus Stevens College of Technology

Master Course Form

Catalog description: This course covers the principles and application of programmable logic controllers (PLC's) as found in a typical manufacturing environment. Topics include understanding the physical components that make up a PLC, basic plc programming, understanding the components that make up I/O. Including AC/DC discrete input modules, analog input and output Modules. How these modules connect to the PLC and to output devices such as motor controls, variable frequency drives, valves, and other types of machine controls.

Digital Description:

- Credit Hours: 4
- Lecture Hours: 3
- Lab Hours: 3

Prerequisites:

Completion of ELME 107 Electrical systems I

Course Objectives:

Upon successful completion of this course, the student will be able to:

1. Demonstrate an understanding the input/output section
2. Explain processor and memory organization
3. Applying numbering systems
4. Understanding and using ladder diagrams
5. Use basic instructions
6. Describe file system
7. Explain program structure
8. Describe and demonstrate start up and troubleshooting procedures

Learning Outcomes:

Upon successful completion of this course, the student will be able to:

- Describe the benefits of programmable logic controls over hardwired relay systems.
- Define the terms discrete and analog.
- Define optical isolation and describe why it is used.
- Explain why a hardwired emergency-stop is desirable.
- Describe what I/O shielding does.
- Define the term *interposing*.
- Describe a typical program scan.
- Explain the terms *on-line* and *off-line* programming.
- Describe the function of the *watch-dog timer*.
- Identify different data types.
- Understand the difference between tasks, programs and routines.

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- Understand decimal, binary, octal, hexadecimal, and binary coded numbering systems.
- Identify a wiring diagram.
- Convert a wiring diagram to a ladder diagram.
- Understand Relay type instructions.
- Write and understand the logic for a standard *Stop/Start* motor circuit.
- Describe the *Force On* and *Force Off* features, and the hazards that could be associated with each.
- Understanding program considerations.
- Use program control instructions.
- Understand and use programmable timers.

Planned Sequence of Learning Activities:

- Understanding the input/output section
- Processor and memory organization
- Numbering systems
- Understanding and using ladder diagrams
- Basic instructions
- Advanced instructions
- Program structure
- Start up and trouble shooting

Required Text:

Technicians Guide to Programmable controllers ISBN-13 978-1-111-54409-6

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