Northwest State Community College  
Course Information Sheet

# Course Information

Title: PLC 1A

Course Number: PLC 126

Credit Hours: 1

Pre-requisite: PLC125

# Description

The course is a study of the installation, programming, and troubleshooting of programmable controlled systems currently used in an industrial environment. The focus will be on installation, programming, engineering, and maintenance tasks performed with PLC systems. The primary PLC used for this class will be the Allen Bradley SLC-500 and CompactLogix, using RSLogix 500, RSLogix5000, and RSLinx software. The topics presented will be learned through online instructional material and hands-on labs.

# Learning Outcomes

Upon completion of this course the students will be able to:

1. Describe the function of a PLC in an industrial environment
2. Create communications between a PLC and a programming panel
3. Configure a simple PLC system

# Required Material

**Text:**

Intro to ControlLogix Programmable Automation Controller, Gary Dunning, 2nd Edition; Publisher Delmar Cengage Learning, ISBN-10: 1-111-53929-4

**Supplies:**

VOM

Screw drivers (Phillips, straight blade)

Wire strippers

# Module 1: Basic Allen Bradley SLC-500 Operation

We will focus on the basic operation of any PLC, including terminology, operation, and hardware. We also will discuss basic communication between the PLC and the programming panel, with the user setting up RSLinx for PLC communication.

Upon completion of this module the student will be able to:

1. Identify the hardware on the SLC-500 training units
2. Use the processor key switch to reset a low level fault
3. Identify the communication ports on an SLC-5/05 processor
4. Explain the different processor modes (Run, Program & Test) and how they affect the operation of the PLC
5. Identify the two most common control voltages found on industrial machinery in the US
6. Determine if a relay instruction in an SLC-500 program should be highlighted based on the type of instruction and the status of the data in the PLC address.
7. Interpret the I/O addressing for a modular SLC-500 system, and a Micrologix fixed system.
8. Explain the scan sequence of a PLC system
9. Explain the process of setting up a serial driver in RSLinx.

### Module 1 Activities

Top of Form

 Review PowerPoint: Overview of PLCs

Text Book Slides

 Review PowerPoint: PLC Hardware Basics

Text Book Slides

 Watch video: Intro to PLC Basics Part 1 (9:22)

<https://www.youtube.com/watch?v=HgPRUWwCGK4>

 Watch video: Intro to PLC Basics Part 2 (10:32)

<https://www.youtube.com/watch?v=Ho7dxr5eGfs>

 Read Hardware Basics SLC-500

See attached PowerPoint presentation

 Read More PLC Basics

See attached PowerPoint presentation

 Read Intro to RSLinx

See attached PowerPoint presentation

 Complete Quiz 126-1

See Quiz PLC126-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 126-1.1, Lab 126-1.2, Lab 126-1.3, Lab 126-1.4

See Lab Documents

 Complete Hands-on Lab 126-1.1

See PLC126 1.1 Lab Document

 Complete Hands-on Lab 126-1.2

See PLC126 1.2 Lab Document

 Complete Hands-on Lab 126-1.3

See PLC126 1.3 Lab Document

Bottom of Form

# Module 2: RSLogix500 and the SLC-500 Basic Instruction Set

We will classify the Rockwell Software applications used to create SLC-500 programs and communicate with the SLC-500 processor. We also will work with the RSLogix 500 application in project view and ladder view windows. We will discuss the RSLogix500 file and database structure and we will be introduced to the Allen Bradley relay type of program instructions.

Upon completion of this module the student will be able to:

1. Identify and explain the terminology for transferring program between the processor and the program panel.
2. Explain what information is sent to the SLC-500 processor during a download.
3. Determine where RSLogix500 projects are stored on the program panel in order to access the description database.
4. Identify the elements in the RSLogix500 ladder view window, such as symbols, instructions, etc.
5. Correlate the SLC-500 relay type instructions to the instructions mnemonics.
6. Explain where the information is acquired from for the ladder view window in RSLogix500 when the user is online or offline.
7. Explain the numbering and function of the program files in an SLC-500 processor.
8. Explain how an SLC-500 controlled machine responds when the processor is in the Run mode versus the Program mode.

### Module 2 Activities

Top of Form

 Read SLC-500 Instruction Set Manual – Chapter 2: Basic Instructions, pages 2-2 to 2-5

Text Book

 Review PowerPoint: Information on RSLinx and RSLogix500

Text Book Slides

 Watch video: Introduction to PLC Ladder Logic (19:09)

<https://www.youtube.com/watch?v=Ei4_HqzUFBs>

 Review PowerPoint: Fundamentals of Logic

Text Book Slides

 Review PowerPoint: Intro to Virtual Machines

See attached PowerPoint presentation

 Watch video: Explanation of the PLC126 Virtual Machines Technology (7:39)

<https://www.youtube.com/watch?v=3NjX5A-3UCY>

 Watch video: Demonstration of the PLC126 Virtual PLC Simulator (7:41)

<https://www.youtube.com/watch?v=8d4s7I8hUFk>

 Review Instructions for Connecting to Virtual Machine

See the attached PowerPoint presentation

 Complete Quiz 126-2

See Quiz PLC126-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 126-2.1, Lab 126-2.2, and Lab 126-2.3

See Lab Documents

 Schedule and complete Hands-on Lab 126-2.1

See PLC126 2.1 Lab Document

 Schedule and complete Hands-on Lab 126-2.2

See PLC126 2.2 Lab Document

 Schedule and complete Hands-on Lab 126-2.3

See PLC126 2.3 Lab Document

Bottom of Form

# Module 3: Allen Bradley SLC-500 Timer & Counter Instructions

In Module 3, we will review the PLC data memory structure and data formats. We will begin to work with operating the Allen Bradley timer and counter instructions and the SLC-500 timer and counter addressing structure. We will practice manipulating and analyzing the RSLogix500 application to create a program with timer and counter instructions.

Upon completion of this module the student will be able to:

1. Interpret the SLC-500 data files that will be used to hold timer values.
2. Based on the time base and preset value, determine the time delay of an SLC-500 timer.
3. Explain the function of the different status bits for timers and counters in an SLC-500 system.
4. Explain the operation of a TON, RTO/RES, and TOF instructions in an SLC-500 program
5. Explain the operation of an automatic resetting timer program in an SLC-500 system.
6. Determine the range of values that can be used for timers and counters in an SLC-500 program.
7. Explain the operation of the CTU, CTD and RES instructions on data values in an SLC500 program.

### Module 3 Activities

Top of Form

 Read SLC-500 Instruction Set Manual – Chapter 2: Timer & Counter Instructions, pages 2-7 to 2-20 Text Book

 Review PowerPoint SLC-500 Timer Basics

See attached PowerPoint presentation

 Review PowerPoint SLC-500 Counter Basics

See attached PowerPoint presentation

 Complete Quiz 126-3

See Quiz PLC126-3 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 126-3.1, Lab 126-3.2, Lab 126-3.3 and Lab 126-3.4

See Lab Documents

 Schedule and complete Hands-on Lab 126-3.13

See PLC126 3.1 Lab Document

 Schedule and complete Hands-on Lab 126-3.2

See PLC126 3.2 Lab Document

 Schedule and complete Hands-on Lab 126-3.3

See PLC126 3.3 Lab Document

 Schedule and complete Hands-on Lab 126-3.4

See PLC126 3.4 Lab Document

Bottom of Form

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