Northwest State Community College  
Course Information Sheet

# Course Information

Title: PLC 3A

Course Number: PLC132

Credit Hours: 1

Pre-requisite: PLC131

# Description

This is an advanced PLC course based on the Allen Bradley ControlLogix platform. The course consists of 3 sections: Ethernet communications and networking, DeviceNet networking, and Wonderware InTouch HMI development and communications.

Students will use the Rockwell Automation Studio 5000 programming software, with RSLinx Gateway, to communicate with primarily ControlLogix L71 type processors. RSNetWorx for DeviceNet will also be used to configure a DeviceNet network. Students will focus on learning these advanced technologies as well as how to troubleshoot these networks and systems when communication fails.

# Learning Outcomes

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

1. Implement Ethernet communications with ControlLogix
2. Implement ControlLogix remote chassis communications via Ethernet

# Required Material

**Text:**

Electrical Motor Controls for Integrates Systems Workbook, Rockis, Gary & Mazur, Glen A., 5th Edition, American Technical Publishers, ISBN: 978-0-8269-1226-8

**Supplies:**

VOM

# Module 1: Configuring ControlLogix Communications with Ethernet I

In Module 1, the students will get an in-depth study of the operation of an industrial network.  Ethernet will be discussed in depth, with the explanation of the IP address, subnet masking, Network ID and Host (Device) ID.  Students will learn the differences between a hub, switch and router, as well as the cabling.  Students will also learn various network topologies such as star, ring and bus networks, and where these are used in various types of networks.  Students will configure the 1756 Ethernet modules for communications from the ControlLogix processor to other Ethernet devices.  Students will learn how a processor obtains an IP address through static or a dynamic process.  Students will also be introduced to Studio 5000, and will setup RSLinx to have Studio 5000 communicate with a ControlLogix processor via Ethernet and Ethernet I/P.  Students will learn how to troubleshoot ethernet connectivity through the IPCONFIG and PING commands.

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

1. Explain the settings in an RSLinx Ethernet I/P driver for a local network.
2. Explain how to determine what caused a fault on an L7x processor.
3. Identify the project files that Studio 5000 creates.
4. Determine what mode the L7x processor must be in when uploading a project with Studio 5000.
5. Explain the communication methods between a RSLinx and a ControlLogix processor.
6. Explain how to navigate to the controller properties in Studio 5000.
7. Determine what scope (controller or program) I/O module tags are in the L7x processor.
8. Explain the purpose of using a USB port on the L7x controller.

### Module 1 Activites

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 Review PDF: Lesson 1 RSLinx ETHIP driver

See attached NSCC PDF file

 Review PDF: Lesson 2 Intro to Studio5000

See attached NSCC PDF file

 Review PDF: Lesson 3 Controllogix L7 processors

See attached NSCC PDF file

 Review PDF: Controllogix Hardware

See attached NSCC PDF file

 Review PDF: ETH Driver Configuration

See attached NSCC PDF file

 Review PDF: Command Line Utilities

See attached NSCC PDF file

 Review PDF: Ethernet Topology

See attached NSCC PDF file

 Review PDF: Intro to Studio5000

See attached NSCC PDF file

 Watch Video: Ethernet Driver Configuration (9:40)

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

 Watch Video: Connecting to the USB port (9:34)

<https://www.youtube.com/watch?v=kEle2JmPR7M>

 Watch Video: Discover IO Modules Configuration (10:06)

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

 Complete Quiz 132-1

See Quiz PLC132-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 132-1.1, Lab 132-1.2 and, Lab 132-1.3

See Lab Documents

 Schedule and complete Hands-on Lab 132-1.1

See PLC132 1.1 Lab Document

 Schedule and complete Hands-on Lab 132-1.2

See PLC132 1.2 Lab Document

 Schedule and complete Hands-on Lab 132-1.3

See PLC132 1.3 Lab Document

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# Module 2:  Configuring ControlLogix Communications with Ethernet II (Remote I/O)

In Module 2, the student will compare ControlLogix local and remote chassis, both with and without a processor in the remote chassis.  Students will set up Ethernet communications between the chassis and learn about local versus remote tags.  Students will also learn how a Message instruction works, and how to setup a Message instruction to read data from a remote processor, and how to write data to a remote processor.  Students will also learn about the Message data type and how to interpret the tags within the tag view screens of Studio 5000.  A heavy focus will be on the troubleshooting of the Message instruction and the data that flows between processors.

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

1. Determine what data format the MAC addresses are stored in.
2. Identify the module number of an Ethernet module on a ControlLogix system.
3. List the different names for the Hardware address of a network device.
4. Determine the Network ID, based on the setting for an IP address and Subnet mask.
5. Determine the highest number that can be used in a version 4 IP address.
6. Determine if a remote chassis requires a processor in a ControlLogix system.
7. Interpret the settings of an Ethernet module properties screen, if the module is located in a remote chassis.
8. Identify what Command Prompt command is used to test the communication to a network device.

### Module 2 Activities

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 Read Allen Bradley EtherNetIP Network Configuration Users Manual - Chapters 1-5, pages 11-70

User’s Manual

 Review PDF: Ethernet Bootp Server

See attached NSCC PDF file

 Review PDF: Command Line Utilities

See attached NSCC PDF file

 Review PDF: Computer Ethernet Setup

See attached NSCC PDF file

 Review PDF: Number Conversion

See attached NSCC PDF file

 Watch Video: Remote Chassis Manual Configuration (24:43)

<https://www.youtube.com/watch?v=-p23bwRzvEM>

 Watch Video: Remote Chassis Module Discovery (6:20)

<https://www.youtube.com/watch?v=qfsA_Qy2jOg>

 Watch Video: Alias Tags (4:57)

<https://www.youtube.com/watch?v=eEsUpTww9rw>

 Watch Video: Command Line Ethernet Commands (7:24)

<https://www.youtube.com/watch?v=5dbeOMwiCMQ>

 Watch Video: Using Bootp DHCP (13:08)

<https://www.youtube.com/watch?v=UHDz8tLwcTI>

 Complete Quiz 132-2

See Quiz PLC132-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 132-2.1, Lab 132-2.2 and, Lab 132-2.3

See Lab Documents

 Schedule and complete Hands-on Lab 132-2.1

See PLC132 2.1 Lab Document

 Schedule and complete Hands-on Lab 132-2.2

See PLC132 2.2 Lab Document

 Schedule and complete Hands-on Lab 132-2.3

See PLC132 2.3 Lab Document

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