Northwest State Community College  
Course Information Sheet

# Course Information

Title: PLC 3B

Course Number: PLC133

Credit Hours: 1

Pre-requisite: PLC132

# 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. Configure peer to peer communications with Message instructions and producer/consumer tags
2. Configure a DeviceNet network to communicate with a ControlLogix platform
3. Troubleshoot a DeviceNet network controlled by a ControlLogix processor

# 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 III (Messaging & Producer/Consumer Tags)

In Module 1, the student will learn how to communicate between two ControlLogix PLCs using producer/consumer tags, as compared to the Message instruction learned in Module 2.  Students will configure Consumer tags in a local processor to receive information from a remote processor, as well as to configure Producer tags in a remote processor that will be the source for the Consumer tag.  Interpreting the properties of these tags are critical for troubleshooting.  Students will also be introduced on how to do this same configuration on their Virtual Machine through the Emulate5000 software by configuring two processors in the same chassis.  A heavy focus will be on troubleshooting the loss of communication between these types of tags.  Troubleshooting will focus on the connectivity, as well as the data configuration and flow.

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

1. Determine what tag data type is used in a Message instruction.
2. Determine what scope a Produced Tag will be in.
3. Explain the purpose of an .ER bit on a Message instruction.
4. Explain the rules for sending data between producer and consumer tags.
5. Determine what data types a Producer Tag can be in.
6. Determine if corresponding producer and consumer tags must be the same data type.
7. Interpret the information within a Message Configuration screen.
8. Determine if a ControlLogix processor can send a Message to an SLC-500 processor.

### Module 1 Activites

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 Read Logix5000 Controllers General Instruction Reference Manual - Chapter 8: Array (File)/Miscellaneous Instructions - Focus on just the Ladder Logic Instructions.

<https://www.politecnica.pucrs.br/professores/tergolina/Automacao_e_Controle/LITERATURA_ADICIONAL_-_1756-pm004_-en-p_Logix5000_Controllers_IO_and_Tag_Data.pdf>

 Watch Video: Video:Part\_1\_Messaging\_IO\_Configuration\_M3 (20:02)

<https://www.youtube.com/watch?v=FKuFTd7jP38>

 Watch Video: Video:Part\_2\_Messages\_M3 (30:54)

<https://www.youtube.com/watch?v=xZ9hOIoM00A>

 Watch Video: Video:Part\_3\_Produced\_Consumed\_Tags\_M3 (13:24)

<https://www.youtube.com/watch?v=TnV_5xnFeeU>

 Complete Quiz 133-1

See Quiz PLC133-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 133-1.1 and, Lab 133-1.2

See Lab Documents

 Schedule and complete Hands-on Lab 133-1.1

See PLC133 1.1 Lab Document

 Schedule and complete Hands-on Lab 133-1.2

See PLC133 1.2 Lab Document

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# Module 2: Configuring & Troubleshooting a Devicenet System I (Stack Light/Prox & Photo-electric)

In Module 2, the student will learn how the Devicenet network operates, as well as the hardware and software required to make the network operate.  Students will review each cable type, as well as the voltages found on each cable.  Various Allen Bradley PLC will be discussed, and how they will connect to the DeviceNet network.  The students will learn how to use RSNetWorx to view a DeviceNet network with various nodes, and how the information flows from the DeviceNet scanner module to and from the ControlLogix processor.  The students will install a stack light on a DeviceNet network and learn how to commission a node onto the network.

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

1. Determine which Allen Bradley PLCs can be used on a DeviceNet network.
2. Identify what software is required to configure a DeviceNet network.
3. Identify the correct terminology used to identify a hardware address on DeviceNet.
4. Determine the DeviceNet node address of a scanner module from a DeviceNet screen.
5. Determine the range of the valid DeviceNet node addresses.
6. Interpret the information within a DeviceNet I/O Data Properties screen.
7. Explain how the DeviceNet network correlates to the producer/consumer tag model.
8. Determine the maximum cable length for a DeviceNet network.

### Module 2 Activities

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 Review PDF: PLC220 Student Lesson 1\_DeviceNet\_Overview\_M4.pdf

See attached NSCC PDF file

 Review PDF: PLC220 Student Lesson 2\_DeviceNet\_Computer Interface Setup\_M4.pdf

See attached NSCC PDF file

 Review PDF: Allen\_Bradley \_DeviceNet\_ Media\_Sensors\_IO.pdf

<https://www.rockwellautomation.com/en-us/products/hardware/allen-bradley/network-security-and-infrastructure/devicenet-networks.html>

 Watch Video: DeviceNet\_Online\_M4 (12:44)

<https://www.youtube.com/watch?v=Wn2uPA9r6uc>

 Watch Video: 1756-DNB-Download\_M4 (12:25)

<https://www.youtube.com/watch?v=4WoQVXU6_HI>

 Watch Video: MAC\_ID\_Stack\_Light\_M4 (13:55)

<https://www.youtube.com/watch?v=Rj39KAlVly8>

 Complete Quiz 133-2

See Quiz PLC133-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 133-2.1, Lab 133-2.2 and, Lab 133-2.3

See Lab Documents

 Schedule and complete Hands-on Lab 133-2.1

See PLC133 2.1 Lab Document

 Schedule and complete Hands-on Lab 133-2.2

See PLC133 2.2 Lab Document

 Schedule and complete Hands-on Lab 133-2.3

See PLC133 2.3 Lab Document

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# Module 3: Configuring & Troubleshooting a DeviceNet System II (Block I/O)

In Module 3, the students will drill down further into the operation of the DeviceNet network, and to learn how to change the mode of the DeviceNet scanner module, as well as to interpret the diagnostic indicators.  The various types of information that will appear on the scanner module display will be defined, as well the definition of each tab on the properties screen such as Scanlist, Input, Output, etc.  The students will learn how to setup up an I/O block on DeviceNet and how to commission the node.  I/O mapping will be discussed, with the student setting these parameters in the scanner module and connecting discrete I/O for testing the data to and from the ControlLogix processor.

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

1. Determine which DeviceNet nodes must be configured with RSNetworx for DeviceNet.
2. Determine which utility with RSNetWorx for DeviceNet will allow the user to configure a component using software settings.
3. Determine which device on the DeviceNet network stores the input and output mapping information.
4. Determine what node number the DeviceNet scanner module must be on a DeviceNet network.
5. Determine if a computer can be configured as a DeviceNet node.
6. Interpret the information in the properties screen of a DeviceNet scanner module.

### Module 3 Activities

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 Review PDF: PLC220 Module 5\_Student Lesson Devicenet Node\_Commissioning.pdf

See attached NSCC PDF file

 Review PDF: AB Devicenet Stack\_Light (855T) Users Manual.pdf

<https://literature.rockwellautomation.com/idc/groups/literature/documents/um/855t-um001_-en-p.pdf>

 Review PDF: AB DeviceNet\_ Media\_Sensors\_Distributed IO.pdf, pages 59-63 and, 68-69

<https://literature.rockwellautomation.com/idc/groups/literature/documents/um/dnet-um072_-en-p.pdf>

 Review PDF: AB 1756-DNB ControlLogix Devicenet Scanner Module Installation Manual.pdf

<https://literature.rockwellautomation.com/idc/groups/literature/documents/in/1756-in566_-en-p.pdf>

 Review PDF: AB 1756-DNB ControlLogix Devicent Scanner Module Users Manual.pdf

<https://literature.rockwellautomation.com/idc/groups/literature/documents/in/1756-in065_-en-p.pdf>

 Review PDF: AB Compact\_Block IO for Devicenet.pdf

<https://literature.rockwellautomation.com/idc/groups/literature/documents/in/1791d-in003_-en-p.pdf>

 Watch Video: DNB\_Mapping\_M5 (23:29)

<https://www.youtube.com/watch?v=2DkChcK1iM8>

 Watch Video: Dnet\_Component\_Parameter\_Change\_M5 (9:14)

<https://www.youtube.com/watch?v=n4d2BtNFzb8>

 Compete Quiz 133-3

See Quiz PLC133-3 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 133-3.1, Lab 133-3.2, Lab 133-3.3 and, Lab 133-3.4

See Lab Documents

 Schedule and complete Hands-on Lab 133-3.1

See PLC133 3.1 Lab Document

 Schedule and complete Hands-on Lab 133-3.2

See PLC133 3.2 Lab Document

 Schedule and complete Hands-on Lab 133-3.3

See PLC133 3.3 Lab Document

 Schedule and complete Hands-on Lab 133-3.4

See PLC133 3.4 Lab Document

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