Northwest State Community College  
Course Information Sheet

# Course Information

Title: PLC 3C

Course Number: PLC134

Credit Hours: 1

Pre-requisite: PLC133

# 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 & Troubleshooting a DeviceNet System III (AC Motor Drive)

In Module 1, the students will learn the hardware required to install a small variable frequency drive (PowerFlex 4) onto the Devicenet network.  Students will configure the Scan list in the scanner module, and map the inputs and outputs in the scanner module.  Advanced mapping will be discussed so the students can separate the status and command data, from the speed control data.  Students will also configure the VFD to use a COMM device for speed control.  Students will then setup the tags in the ControlLogix processor to communicate with the Power-Flex 4 VFD, using Start/Stop control, Jog Control and Speed Control.  Basic troubleshooting of the system will be discussed.

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

1. Determine the different modes of operation of a DeviceNet scanner module.
2. Determine how many elements are in the Input Data Array of a DeviceNet scanner module.
3. Determine the ControlLogix tag that changes the mode of DeviceNet scanner module, given the slot the scanner module is located in.
4. Determine what ControlLogix tag information will be scrolling across the display of a DeviceNet scanner module, based on the slot number the scanner is located in.
5. Interpret the information on the General tab of the DeviceNet scanner module’s properties display screen.
6. Determine if a new network configuration can be downloaded to a DeviceNet scanner module when it is in the RUN mode.
7. Explain how a DeviceNet scanner module is affected when the ControlLogix unit is put into the Program mode.
8. Interpret the information on the Input tab of the DeviceNet scanner module’s properties display screen.

### Module 1 Activites

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 Read AB Powerflex DeviceNet Adapter\_User\_Manual

<https://literature.rockwellautomation.com/idc/groups/literature/documents/um/22comm-um003_-en-p.pdf>

 Read Powerflex\_4\_User\_Manual

<https://literature.rockwellautomation.com/idc/groups/literature/documents/um/22comm-um003_-en-p.pdf>

 Watch Video: DeviceNet\_Troubleshooting\_M6 (27:13)

<https://www.youtube.com/watch?v=pwLgJfh1M6Q>

 Complete Quiz 134-1

See Quiz PLC134-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 134-1.1, Lab 134-1.2 and, Lab 134-1.3

See Lab Documents

 Schedule and complete Hands-on Lab 134-1.1

See PLC134 1.1 Lab Document

 Schedule and complete Hands-on Lab 134-1.2

See PLC134 1.2 Lab Document

 Schedule and complete Hands-on Lab 134-1.3

See PLC134 1.3 Lab Document

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# Module 2: Configuring & Troubleshooting a Wonderware HMI System I

In Module 2, the students will learn the basic operation of a computer-based HMI system, and be introduced to the popular Wonderware InTouch HMI.  A critical portion of this course is to learn how DDE and OPC communication works to tie PLC hardware together with computer applications.  Students will first learn about a DDE server and how the Application, Topic and Item is structured for data communications.  RSLinx Gateway will be used as the DDE server in this course.  Students will learn how to use discrete objects such as switch and indicator objects in the InTouch screens.  The student will setup the ControlLogix processor with tag and program information to communicate with the InTouch screens, as well as how to configure RSLinx to tie the PLC and InTouch together.  Students will also learn how to troubleshoot communication problems on a DDE system.

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

1. Explain what the term “objects” mean when working with InTouch.
2. Determine what type of tags the InTouch can access within a ControlLogix processor.
3. Explain where the tags for InTouch is stored.
4. Determine which object is selected when viewing an InTouch screen.
5. Identify a Wizard object within the InTouch window.
6. Determine how to identify a hidden tag in InTouch.

### Module 2 Activities

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 Read Wonderware InTouch User Guide

<https://kishorekaruppaswamy.wordpress.com/wp-content/uploads/2011/10/intouch-wonderware-manual.pdf>

 Review PDF: Lesson 1 Creating an InTouch HMI Application

See attached NSCC PDF file

 Review PDF: Lesson 2 Introduction to WindowMaker

See attached NSCC PDF file

 Review PDF: Lesson 3 Tagname Dictionary

See attached NSCC PDF file

 Review PDF: Lesson 4 Working with Wizard Objects

See attached NSCC PDF file

 Review PDF: Lesson 5 Working with Drawing Bar Objects Animation Links

See attached NSCC PDF file

 Review PDF: Lesson 6 I/O Communications using RSLinx

See attached NSCC PDF file

 Watch video: Create\_InTouch\_Application\_M7 (6:10)

<https://www.youtube.com/watch?v=LK6q9Hd12DQ>

 Watch video: Graphics\_DDE\_M7 (28:36)

<https://www.youtube.com/watch?v=WGP0fDw_yic>

 Watch video: Kepserver\_Scaling\_M7 (14:38)

<https://www.youtube.com/watch?v=dTQnbS7E1Zs>

 Complete Quiz 134-2

See Quiz PLC134-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 134-2.1

See Lab Documents

 Schedule and complete Hands-on Lab 134-2.1

See PLC134 2.1 Lab Document

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# Module 3:

# Configuring & Troubleshooting a Wonderware HMI System II

In Module 3, the students will do a project that will tie the Wonderware InTouch HMI together with the PowerFlex 4 VFD on a DeviceNet network, back to the ControlLogix PLC.  The students will create the following objects on an InTouch screen: Start pushbutton, Stop pushbutton, Jog pushbutton, Drive Ready indicator, and Drive Running indicator.  The students will also use a numeric object to control the speed of the VFD.  RSLinx Gateway will be configured to do duplex communications between InTouch and the ControlLogix processor, with the Processor then communicating with the DeviceNet scanner module.  Students will also be required to configure internal tags in both the InTouch and ControlLogix.  Students will also learn how to troubleshoot communication issues between InTouch, the PLC and the VFD.

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

1. Determine what version of RSLinx will allow DDE communications.
2. Determine what application will start the InTouch Simulator application.
3. Determine what InTouch tags can communicate via DDE.
4. Interpret all the information on the InTouch Add Access Name screen.
5. Determine scope level of ControlLogix tags can be accessed by DDE communications.
6. Explain what the terms: Application:Topic:Item mean in DDE communications.
7. Explain the terms of importing and exporting screens to other InTouch applications.
8. Explain how multiple objects can be chosen in InTouch and converted to a Symbol.

### Module 3 Activities

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 Read Wonderware InTouch User Guide

<https://kishorekaruppaswamy.wordpress.com/wp-content/uploads/2011/10/intouch-wonderware-manual.pdf>

 Review PDF: Lesson 1 Import / Export of Screens

See attached NSCC PDF file

 Review PDF: Lesson 2 Application Publisher

See attached NSCC PDF file

 Review PDF: Lesson 3 Using RSLinx Wonderware

See attached NSCC PDF file

 Watch Video: Using\_Application\_Publisher\_M8 (11:15)

<https://www.youtube.com/watch?v=smSvRbc6cv4>

 Watch Video: M8 Wonderware Import\_Export (7:11)

<https://www.youtube.com/watch?v=yv6eAZByLBs>

 Complete Quiz 134-3

See Quiz PLC134-3 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 134-3.1

See Lab Documents

 Schedule and complete Hands-on Lab 134-3.1

See PLC134 3.1 Lab Document

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