Northwest State Community College  
Course Information Sheet

# Course Information

Title: PLC 2B

Course Number: PLC130

Credit Hours: 1

Pre-requisite: PLC129

# Description

This course is an in-depth study of the Allen Bradley CompactLogix system and how to use RSLogix5000 programming software to program, monitor, and troubleshoot a system. The primary focus will be on the processor memory structure, the intermediate instruction set, analog I/O modules, and using the RSLogix5000 software. Students will learn all the data structures used across most industrial PLCs, as well as a tag-based system versus an address-based system (SLC-500). Learning how the instructions work within a program will be an essential part of skills development for troubleshooting. A critical part of this course is learning how to search for objects in the L5000 project with RSLogix5000 as a method of increasing troubleshooting efficiency. Students will also learn of the different programming languages used for the ControlLogix platform (Ladder Logic, Structured Text, Sequential Function Charts).

# Learning Outcomes

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

1. Implement CompactLogix Program Control instructions
2. Interpret CompactLogix data types and tag types
3. Configure CompactLogix data types and tag types
4. Implement CompactLogix project structures

# 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: AB ControlLogix/CompactLogix Types of Data Tags

In Module 1, the student will learn more in depth facts about how various data types work in the Allen Bradley ControlLogix system.  The various Atomic Data Types: SINT, INT, DINT, REAL & BOOL, will be discussed, as well as how the data is rounded when working with REAL data.  Students will be introduced the function and operation of the SQO, sequencer output instruction.  Masking data will be further discussed and how it is used with a sequencer output instruction.    Students will also be introduced to user-defined data Tags, and how they can be applied in an industrial setting.

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

1. Explain the different types of Atomic data types in the ControlLogix processor.
2. Explain what data types are used to make up a COUNTER or TIMER type of tag.
3. Determine the data range of the SINT data type.
4. Explain how many bits make up a BOOL or DINT type of data type.
5. Explain how many bits are in a bit, byte and word in a PLC.
6. Determine which data type would allow numbers with decimal points.
7. Explain what other data types a SINT type tag value can be moved into.
8. Determine what value a REAL type of number is rounded to when moved to a DINT tag.

### Module 1 Activites

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 Read Intro to ControlLogix PAC - Chapter 9: Creating and Monitoring RSLogix 5000 Tags, pages 234-250.

Text Book

 Read Logix5000 Controllers General Instruction Reference Manual: Chapter 21: Common Attributes for General Instructions Data Conversions, page 792

Text Book

 Read Logix5000 Controllers General Instruction Reference Manual - Chapter 10: Sequencer Instructions SQO - Sequencer Output, page 537

Text Book

 Watch Video: FAL Data Tag (13:16)

<https://www.youtube.com/watch?v=N9rMiH1R8RY>

 Watch Video: SQO Data Tags (12:14)

<https://www.youtube.com/watch?v=TCgk3y3X_AY>

 Complete Quiz 130-1

See Quiz PLC130-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 130-1.1, Lab 130-1.2, Lab 130-1.3 and, Lab 130-1.4

See Lab Documents

 Schedule and complete Hands-on Lab 130-1.1

See PLC130 1.1 Lab Document

 Schedule and complete Hands-on Lab 130-1.2

See PLC130 1.2 Lab Document

 Schedule and complete Hands-on Lab 130-1.3

See PLC130 1.3 Lab Document

 Schedule and complete Hands-on Lab 130-1.4

See PLC130 1.4 Lab Document

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# Module 2: AB ControlLogix/CompactLogix Project Structure, Tasks & Programs

In Module 2, the student will learn what the controller Tasks are, their purpose, and how they are organized in the controller organizer view.  The students will learn how continuous, periodic and event Tasks work, and how to interpret them within RSLogix5000.  The students will also study how programs and routines work within the ControlLogix memory.  The focus of this course will be on ladder logic programming, but the other types of programming will be discussed in the readings.  It is very important for the student to learn how to view the ladder logic in a specific routine.  Program Tags, and how they compare to Controller Tags, will also be discussed, as well as how to view each type.  An important aspect of this module will be how the fault routines work, and how to view them.

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

1. Explain the differences between Routine, Programs and Tasks.
2. Determine which type of task is the default task in a CompactLogix project.
3. Explain the operation and parameters of a periodic task.
4. Identify a periodic, event and continuous task based on their icon in the controller organizer window.
5. Determine the name of the default task in a CompactLogix project.
6. Explain the difference between a program and routine in a CompactLogix project.
7. Explain what window/tab to set the priority and period settings for a Periodic Task.
8. Explain what determines the sequence of scanning the programs in a ControlLogix project.

### Module 2 Activities

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 Read Intro to ControlLogix PAC - Chapter 4: RSLogix 5000 Project Organization, pages 106-125

Text Book

 Read Logix5000 Controllers General Instruction Reference Manual - Chapter 11: Program Control Instructions, page 577

Text Book

 Read Logix5000 Controllers Design Considerations Manual - Chapter 2: Logix Execution, pages 24 – 30

Text Book

 Watch Video: Tasks and Programs Video (19:50)

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

 Complete Quiz 130-2

See Quiz PLC130-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 130-2.1, Lab 130-2.2 and, Lab 130-2.3

See Lab Documents

 Schedule and complete Hands-on Lab 130-2.1

See PLC130 2.1 Lab Document

 Schedule and complete Hands-on Lab 130-2.2

See PLC130 2.2 Lab Document

 Schedule and complete Hands-on Lab 130-2.3

See PLC130 2.3 Lab Document

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# Module 3:

# AB ControlLogix/CompactLogix Project Structure, Routines

In Module 3, the student will learn more in depth how main routines, subroutines and fault routines all work, as well as the instructions used to navigate between them such as JSR, SBR and RET.  Different programming languages will also be discussed, such as Ladder, Structured Text, Function Blocks and Sequential Function Charts.  The passing of parameters between routines will also be discussed.  There will also be a more in depth learning of the fault routines.

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

1. Explain what is stored in Routine, Programs and Tasks.
2. Explain how the main routine is the first to be scanned, and identify it’s icon.
3. Explain the different programming languages in the ControlLogix platform.
4. Explain the purpose of a JSR instruction, and how it works.
5. From the controller organizer window, determine if a routine is a Main or Fault type.
6. Explain how to pass parameters to and from subroutines.
7. From the controller organizer window, determine if a routine is a ladder logic routine.
8. Determine what instructions will send/receive parameters with a subroutine.

### Module 3 Activities

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 Read Logix5000 Controllers General Instruction Reference Manual - Chapter 7: Move/Logical Instructions, (Focus on just the Ladder Logic Instructions) page 554, JSR,SBR, RET

 Read Logix5000 Controllers Design Considerations Manual - Chapter 2: Logix Execution, pages 24 - 30

 Watch Video: Routines Video

<https://www.youtube.com/watch?v=LJLbWJCHf9A>

 Complete Quiz 130-3

See Quiz PLC130-3 Content Packaging files to upload into an LMS System

 Review Hands-on lab 130-3.1

See Lab Documents

 Schedule and complete Hands-on Lab 130-3.1

See PLC130 3.1 Lab Document

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