



Western Technical College

10620139 Advanced PLC Programming

Course Outcome Summary

Course Information

Description	Hardware and software found in RSLogix 5000 Programmable Logic Controllers are presented. Tag-based programming will be used and applied in ladder logic programs. Other programming languages that will be explored include Function Block and Structured Text.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	72

Pre/Corequisites

Prerequisite 10620153 Basic PLC Programming

Textbooks

Programmable Logic Controllers. 6th Edition. Copyright 2023. Petruzella, Frank D. Publisher: McGraw-Hill Publishing Company. **ISBN-13:** 978-1-264-16334-2. Required.

Success Abilities

1. Refine Professionalism: Act Ethically

Course Competencies

1. Commission an Allen Bradley programmable logic controller (PLC) and Studio 5000 software.

Assessment Strategies

- 1.1. Written Objective Test

1.2. Skill Demonstration

Criteria

You will know you are successful when

- 1.1. you select and install cables and wires.
- 1.2. you connect PC to the PLC.
- 1.3. you connect the PLC to power.
- 1.4. you program Ethernet address to the PC.
- 1.5. you program Ethernet address to the PLC.
- 1.6. you configure Ethernet driver.
- 1.7. you configure the communication between the PC and the PLC.
- 1.8. you troubleshoot operation of hard wired system.
- 1.9. you interpret language and terminology of the software.

Learning Objectives

- 1.a. Employ Studio 5000 software to commission a PLC.
- 1.b. Locate correct cables and wires needed.
- 1.c. Connect PC to the PLC.
- 1.d. Connect the PLC to power.
- 1.e. Set static Ethernet address to the PC.
- 1.f. Set static Ethernet address to the PLC.
- 1.g. Configure Ethernet driver.
- 1.h. Create communication between the PC and the PLC.

2. Investigate Studio 5000 data addressing systems.

Assessment Strategies

- 2.1. Written objective test
- 2.2. Skill demonstration

Criteria

You will know you are successful when

- 2.1. you compare and contrast tag based and address based software.
- 2.2. you identify types and manufacturers of tag based software.
- 2.3. you identify the structure RSLogixs 5000 software.
- 2.4. you apply configurations to use tag based software.
- 2.5. you identify key components of the Studio 5000 data addressing systems.

Learning Objectives

- 2.a. Compare tag based and address based software.
- 2.b. Identify types and manufacturers of tag based software.
- 2.c. Investigate RSLogixs 5000 software.
- 2.d. Identify the different levels in the Studio 5000 software (task, program, routine).
- 2.e. Investigate added capability options.
- 2.f. Investigate necessary configurations to utilize tag based software.

3. Program a Studio 5000 project using tag based software.

Assessment Strategies

- 3.1. Written Objective Test
- 3.2. Skill Demonstration

Criteria

You will know you are successful when

- 3.1. you create a project.
- 3.2. you create tags needed for programming.
- 3.3. you select tasks needed for the project.
- 3.4. you create applicable programs.
- 3.5. you create routines for the programs.
- 3.6. you troubleshoot operation of basic elements.
- 3.7. you fix any problems identified.

3.8. you interpret and apply programming language.

Learning Objectives

- 3.a. Identify all the components for a project in Studio 5000.
- 3.b. Create a project.
- 3.c. Create tags needed for programming.
- 3.d. Select tasks needed for the project.
- 3.e. Create applicable programs.
- 3.f. Create routines for the programs.
- 3.g. Troubleshoot operation of basic elements.
- 3.h. Fix any problems identified.

4. Program in Ladder Logic.

Assessment Strategies

- 4.1. Written objective test
- 4.2. Skill demonstration

Criteria

You will know you are successful when

- 4.1. you program XIO and XIC commands.
- 4.2. you program OTE, OTL and OTU commands.
- 4.3. you program One Shot commands
- 4.4. you program Bit Shift instructions.
- 4.5. you program the MOV and MVM commands.
- 4.6. you program Subroutines.
- 4.7. you program timers and counters.
- 4.8. you program math and comparison instructions.
- 4.9. you use the sequencer instruction.
- 4.10. you verify the operation of the programs.
- 4.11. you define and apply terms related to programming in Ladder Logic.

Learning Objectives

- 4.a. Program XIO and XIC as it pertains to input devices.
- 4.b. Program OTE, OTL and OTU as it pertains to output devices.
- 4.c. Program One Shot as it pertains to input devices.
- 4.d. Program Bit Shift instructions.
- 4.e. Program the MOV and MVM commands.
- 4.f. Program Subroutines.
- 4.g. Program math and comparison instructions.
- 4.h. Utilize the sequencer instruction.
- 4.i. Verify the operation of the programs.
- 4.j. Fix any problems identified.

5. Program in Structured Text.

Assessment Strategies

- 5.1. Written objective test
- 5.2. Skill demonstration

Criteria

You will know you are successful when

- 5.1. you use the jump to subroutine (JSR) instruction.
- 5.2. you program "IF THEN" statements.
- 5.3. you program "ELSIF" statements.
- 5.4. you program assignment statements.
- 5.5. you program arithmetic operators.
- 5.6. you use combination logic for control.
- 5.7. you verify the operation of the programs.
- 5.8. you troubleshoot structured text programs.
- 5.9. you fix any problems identified.
- 5.10. you define and apply terminology related to Structured Text programming.

Learning Objectives

- 5.a. Utilize the jump to subroutine (JSR) instruction.
- 5.b. Program "IF THEN" statements.
- 5.c. Program "ELSIF" statements.
- 5.d. Program assignment statements.
- 5.e. Program arithmetic operators.
- 5.f. Utilize combination logic.
- 5.g. Troubleshoot structured text programs.
- 5.h. Fix any problems identified.

6. Program in Function Block (FB).

Assessment Strategies

- 6.1. Written objective test
- 6.2. Skill demonstration

Criteria

You will know you are successful when

- 6.1. you program FB ADD instruction.
- 6.2. you program FB OR instruction.
- 6.3. you program FB counters.
- 6.4. you program FB timers.
- 6.5. you program Boolean FB instructions.
- 6.6. you program FB math instructions.
- 6.7. you use IREFs, OREFs, OCONs, ICONs to terminate function blocks.
- 6.8. you create multiple sheets for the program.
- 6.9. you reset blocks utilizing a feedback loop.
- 6.10. you verify operation of programs.
- 6.11. you troubleshoot function block programs.
- 6.12. you fix any problems identified.
- 6.13. you define and apply terminology related to Function Block programming.

Learning Objectives

- 6.a. Program FB ADD instruction.
- 6.b. Program FB OR instruction.
- 6.c. Program FB counters.
- 6.d. Program FB timers.
- 6.e. Program boolean FB instructions.
- 6.f. Program FB math instructions.
- 6.g. Utilize IREFs, OREFs, OCONs, ICONs to terminate function blocks.
- 6.h. Create multiple sheets for the program.
- 6.i. Reset blocks utilizing a feedback loop.
- 6.j. Troubleshoot function block programs.
- 6.k. Fix any problems identified.