

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Electrical/Electromechanical Technology Program
Revision Date: August 23, 2021

I. CATALOG DESCRIPTION

Course Number: ELEC 2624
Course Title: Programmable Logic Controllers II
Prerequisite(s): ELEC 2534
Catalog Description: Programming, wiring and troubleshooting of Programmable Logic Controller (PLC).
Credit Hours: 6
Class Hours: 45
Lab Hours: 135
Total Contact Hours: 180

II. COURSE OBJECTIVES: *Course will:*

- A. Introduce advanced PLC platforms.
- B. Introduce advanced PLC programming languages.
- C. Compare and contrast major PLC platforms and manufacturers.
- D. Introduce industrial communications platforms and their application.
- E. Identify the major features of the TCP/IP protocol suite as they apply to industrial communication.
- F. Familiarize the student with HMI operation and programming.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Wire, program and maintain Programmable Logic Controller systems.
 - 2. Interpret programs written for various brands of Programmable Logic Controllers.
 - 3. Apply proper troubleshooting techniques to PLC systems.
 - 4. Troubleshoot the interfacing between PLCs and other automation devices.
 - 5. Configure common industrial communications systems.
 - 6. Define the terminology utilized in automation systems.
 - 7. Identify the communications methods utilized between automation devices and controls.
 - 8. Communicate with other regarding networking needs and concerns.
 - 9. Identify parts of the communications protocols.
 - 10. Program basic tasks using multiple PLC programming languages.
 - 11. Configure and program a basic HMI application.
 - 12. Troubleshoot common industrial communications systems.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #3: Critical Thinking & Problem Solving
 - Outcome 5: Acquire and integrate knowledge and construct relationships across disciplines.

IV. CONTENT/TOPICAL OUTLINE

- A. PLC Discrete I/O Wiring Circuits
 - 1. PLC I/O options
 - 2. Wiring and troubleshooting I/O

- 3. Safety circuits
- B.** PLC System Troubleshooting
 - 1. Troubleshooting I/O
 - 2. Troubleshooting controllers and I/O adapters
- C.** Analog I/O
 - 1. Analog I/O
 - 2. Testing and troubleshooting analog I/O
- D.** Data Handling & Math Instructions
 - 1. Integer and floating point data types
 - 2. Integer and floating point instructions
- E.** Sequencer Instructions
 - 1. Control structure
 - 2. Sequencer programming
- F.** Industrial Data Communications
 - 1. Network comparisons
 - 2. Network protocols
 - 3. Network configuration
- G.** ControlLogix
 - 1. ControlLogix and MicroLogix differences
 - 2. ControlLogix Architecture
 - 3. Organizing data
- H.** Siemens PLC
 - 1. Siemens Architecture
 - 2. Siemens Programming
- I.** Human Machine Interface (HMI)
 - 1. Theory of operation
 - 2. HMI software and programming

V. INSTRUCTIONAL MATERIALS

- A.** Required Text(s): Introduction to the ControlLogix Programmable Automation Controller
- B.** Other Resources: Various online materials are required and determined by the individual instructor.
- C.** Supplies:
 - 1. Three-ring Notebook
 - 2. Three-ring Index Dividers
 - 3. No. 1 Phillips Screwdriver
 - 4. Small (1/8" – 3/16") Slotted Screwdriver
 - 5. USB Removable Drive

VI. METHODS OF PRESENTATION/INSTRUCTION

- A.** Methods of presentation typically include a combination of the following:
 - 1. Lecture 45 hours
 - 2. Lab 135 hours

VII. METHODS OF EVALUATION

- A.** Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Overall course grade shall consist of 50% Theory grade and 50% Lab grade.
 - 2. Theory Grade (50% of total course grade)

3. A combination of tests, quizzes and homework.
4. Lab Grade (50% of total course grade)

VIII. SPECIFIC COURSE REQUIREMENTS

- A. A minimum grade of 60% is required.
- B. Cheating within the Manufacturing Division: Any violation of academic integrity on assignments, quizzes, or tests will result in a grade of 0 on that assignment, quiz, or test. A second violation in any course after the initial infraction will result in a grade of F for that course. Any additional violations while in the program will result in a suspension from the program.
- C. Credit by Examination: Credit for the course CANNOT be earned through Credit by Examination.