SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Electrical/Electromechanical Technology Program
Revision Date: August 22, 2022

I. CATALOG DESCRIPTION

Course Number:	ELEC2534
Course Title:	Programmable Logic Controllers I
Prerequisite(s):	ELEC 2540
Corequisite(s):	None
Catalog Description:	An introduction to number systems, logic functions, Boolean algebra and the Programmable Logic Controller (PLC).
Credit Hours:	3
Class Hours:	30
Lab Hours:	45
Total Contact Hours:	75

II. COURSE OBJECTIVES: *Course will:*

A. Introduce basic concepts of the Programmable Logic Controller and its architecture.
B. Review number systems and introduce logic functions.
C. Introduce fundamentals of major PLC instructions.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. Student Learning Outcomes**:** *Student will be able to:*
- **1.** Interpret PLC programs using relay, timer and counter instructions.
- **2.** Identify basic logic functions in a PLC program.
- **3.** Monitor data in a PLC using different number systems.
- **4.** Convert between common number systems.
- **5.** Solve basic circuit design problems.

B. General Education Learning Outcomes (GELOs)
- **1.** GELO #3: Critical Thinking & Problem Solving
- **2.** Outcome 4: Evaluate the validity of arguments, alternatives, data, outcomes, and/or impacts of actions.

IV. CONTENT/TOPICAL OUTLINE

A. Logic Functions –Lecture
- **1.** Boolean functions
- **2.** Logic symbols
- **3.** Relay logic diagrams
- **4.** Expressions and simplification

B. Number Systems – Lecture
- **1.** Number systems
- **2.** Number system conversions

C. Programmable Logic Controller (PLC) Introduction – Lecture
- **1.** Block diagram
- **2.** Operating (scan) cycle
- **3.** PLC programming languages

D. Basic PLC Instructions – Lecture
- **1.** Relay Instructions
- **2.** Addressing discrete I/O, bit and status files

3. Applications using relay instructions
4. Convert relay circuits to PLC programs

E. PLC Programming Software – Lecture
1. Program Entry
2. Symbolic addressing
3. Documentation

F. PLC Timers and Counters – Lecture
1. Timer and counter instructions
2. Addressing timers and counters
3. Preset and accumulated values
4. Time base
5. Status bits
6. Applications using timer and counter instructions
7. Convert timer and counter circuits to PLC programs

G. PLC Programming – Lecture
1. Sequencer and state machine techniques
2. Flow chart
3. State chart

H. PLC Wiring – Lecture
1. PLC wiring diagrams
2. Sinking and Sourcing I/O Circuits
3. PNP and NPN sensors

I. Analog I/O – Lecture
1. Addressing analog I/O
2. Analog data calculations

V. INSTRUCTIONAL MATERIALS

A. Required Text(s): Introduction to the ControlLogix Programmable Automation Controller

B. Other Resources: None

C. Supplies: Three-Ring Notebook, Three-Ring Index Dividers and USB Removable Drive

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:
1. Lecture 30 hours
2. Lab 45 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.