South Central College

MECA 2150 Mechatronics Systems Operations II

Course Outcome Summary

Course Information

Description
This course will focus on advanced principals of Programmable Logic Controllers (PLC). The student will become familiar with interfacing input and output with automation motion control systems used in manufacturing. Introduction of analog inputs and outputs, internal registers and tables, comparison functions, computational functions, data move functions, subroutines, data manipulation and sequencing functions, high speed counting, analog functions, trigonometric and advanced math functions. Technical writing skills and safety procedures will be implemented throughout the course. (Prerequisites: MECA 1250)

Total Credits 3
Total Hours 64

Types of Instruction

Instruction Type Credits/Hours
Lecture
Lab

Pre/Corequisites

MECA 1122 ELECTRICITY - DEVICES AND CIRCUITS I
MECA 1125 ELECTRICITY - DEVICES AND CIRCUITS II
MECA 1250 MECHATRONICS SYSTEM OPERATION I

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Describe Program Control Instructions

Learning Objectives
Discuss Control Background
Recognize Principles of Operation
Analyze Functions of Subroutines
Identify Immediate Input and Output Instructions Function

2. **Define Forcing Inputs and Outputs**

   **Learning Objectives**
   - Identify Safety Practices
   - Apply Forcing Methods to Inputs
   - Apply Forcing Methods to Outputs
   - Interpret Register Tables

3. **Apply Interrupts**

   **Learning Objectives**
   - Explain Interrupt Concept
   - Demonstrate Fault Routine
   - Use Temporary END Instruction

4. **Explain Data Manipulation Instructions**

   **Learning Objectives**
   - Define Data Manipulation and Apply it to a PLC Program
   - Demonstrate the Operation of the Word-Level Instructions Used to Copy Data from One Memory Location to Another
   - Interpret Data Transfer and Data Compare Instructions

5. **Clarify Open and Closed Loop Systems**

   **Learning Objectives**
   - Describe the Basic Operation of an Open-Loop System
   - Describe the Basic Operation of a Closed-Loop System
   - Demonstrate Set-Point Control

6. **Identify Math Instructions**

   **Learning Objectives**
   - Analyze and Interpret Mant Instructions
   - Create PLC Programs Involving Math Instructions
   - Apply Combinations of PLC Arithmetic Functions to Processes
   - Demonstrate Other Word-Level Math Instructions in PLC Programs

7. **Explain Sequencer and Shift Register Instructions**

   **Learning Objectives**
   - Identify the Various Forms of Mechanical Sequencers
   - Interpret and Explain Information Associated with PLC Sequence Input, Output and Load Instructions
   - Explain the Operation of Bit and Word Shift Registers

8. **Identify Analog to Digital Systems**

   **Learning Objectives**
   - Identify Resolution
   - Define Linear Analog to Digital Converters
   - Define Non-Linear Analog to Digital Converters
   - Demonstrate Sample Rate

9. **Interpret Proccss Control and Data Acquisition Systems**

   **Learning Objectives**
   - Discuss the Operation of Continuous Process
   - Discuss the Operation of Batch Production
   - Discuss the Operation of Individual Products Production
   - Compare Individual, Centralized and Distributive Control Systems
   - Outline the Functions of the Different Parts of a Data Acquisition System
10. **Implement Computer Controlled Machines and Processes**

   Learning Objectives
   - Discuss How a Computer’s Operating System is Designed to Function
   - Explain How a Work Cell Functions
   - Compare the Methods by Which Computers Communicate with Each Other
   - Demonstrate a Robotic Computer Controlled System

11. **Describe PLC System Installation**

   Learning Objectives
   - Outline and Describe requirements for a PLC Enclosure
   - Identify and Describe the Functions of Bleeder Resistors in PLCs
   - Demonstrate Proper Grounding Practices
   - List and Describe Specific PLC Troubleshooting Procedures

SCC Accessibility Statement

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: [www.southcentral.edu/disability](http://www.southcentral.edu/disability)

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