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 Fuctions of Subroutines
Identify Immediae 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 Progarm
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 an 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 adn 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 Procross Control and Data Acquisition Systems

Learning Objectives
Discuss the Operation of Continuous Process
Discuss the Operation of Batch Production
Discuss the Operaiton of Individual Products Production
Compare Individual, Centralized and Distributive Control Systems
Outline the Functions of the Different Parts of a Data Acquistion 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
Demostrate 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

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