South Central College

MECA 2250  Mechatronics Systems Operations III

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 PLC networking, Supervisory Control and Data Acquisition (SCADA), Proportional - Integral - Derivative (PID) Control and the use of Human Machine Interface (HMI) in a Control System. Troubleshooting exercises, technical writing assignments and safety procedures will be implemented throughout the course. Prerequisites: MECA 2150: Mechatronics Systems Operations II.

Total Credits 3
Total Hours 64

Types of Instruction

Instruction Type Credits/Hours
Lecture
Lab

Pre/Corequisites
MECA 2150 Mechatronics Systems Operations II

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. Review Program Control Instructions
   Learning Objectives
   Discuss Control Background
   Recognize Principles of Operation
   Analyze Functions of Subroutines
2. **Design a Control System**
   Learning Objectives
   - Identify Safety Practices
   - Develop a Control System Incorporating a PLC, PID Device and HMI
   - Document Control System
   - Interpret Control System Results

3. **Use Function Blocks**
   Learning Objectives
   - Explain Function Blocks
   - Develop Function Block Diagram
   - Demonstrate Function Block Programming

4. **Explain SCADA Systems**
   Learning Objectives
   - Define SCADA systems
   - Demonstrate the Operation of a SCADA system
   - Explain the SCADA system on the FMS 200

5. **Incorporate 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 System Approach to Troubleshooting the FMS 200**
   Learning Objectives
   - Identify System Components
   - Demonstrate Component Level Troubleshooting
   - Demonstrate System Approach to Troubleshooting

7. **Interpret PID Systems**
   Learning Objectives
   - Discuss the Operation of PID Systems
   - USE PID Systems with a PLC
   - Outline the Functions of the Different Parts of a PID System

8. **Define PLC Networking**
   Learning Objectives
   - Discuss How a Computer's Operating System is Designed to Function
   - Explain How a Work Cell Functions in regards to the FMS 200
   - Compare the Methods by Which Control Systems Communicate with Each Other

9. **Explore Human Machine Interface (HMI) use in a Control System**
   Learning Objectives
   - Review the use of HMI systems
   - Program HMI
   - Integrate HMI into Control System

**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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