South Central College

MECA 2240  Senior Project

Course Outcome Summary

Course Information

Description  The Senior Project at South Central College (SCC) is an opportunity for students to demonstrate what they know and to showcase their achievement. The project must be successfully completed as a component of the Mechatronics program, which is a required course for all graduating seniors. The Senior Project is a fitting conclusion to a student's education because through this endeavor, one is able to demonstrate accumulated skills in reasoning, research, problem solving, human interaction, organization, and public speaking. This course may also include an internship and will follow the SCC internship guidelines. This course may also be taken in variable increments of 1 to 5 credits. (Prerequisite: MECA 2150 - Mechatronics Systems Operations I or consent of Instructor).

Total Credits  5
Total Hours  240

Types of Instruction

Instruction Type  Credits/Hours
On-Off Campus Lab  1-5/48-240

Pre/Corequisites

MECA 2150 - Mechatronics Systems Operations I or consent of Instructor

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. Understand the need for work-space safety.
   Learning Objectives
   Review Lab Safety
   Demonstrate Lab Safety
Explain Safety Systems

2. **Explore design project parameters.**
   Learning Objectives
   Review Project Budget
   Apply Manufacturability
   Analyze Problem Solving Activities
   Demonstrate Engineering Methods During Design Process

3. **Develop basic model.**
   Learning Objectives
   Use 3D Modeling Features
   Identify Drawing Parameters
   Develop Concept Drawing
   Create Finished Drawing

4. **Integrate electronic circuit protection.**
   Learning Objectives
   Demonstrate Circuit Essentials
   Explain the Unit of Current, Unit of Voltage and the Unit of Resistance
   Demonstrate the Use of Circuit Symbols and Diagrams

5. **Operate electrical measurement meters.**
   Learning Objectives
   Operate a Voltmeter
   Use an Ammeter
   Operate an Ohmmeter
   Demonstrate the Safety Precautions When Using Electrical Meters

6. **Identify electric motors.**
   Learning Objectives
   Explain Motor Classifications
   Describe Motor Enclosures
   Incorporate Motors into Project Design

7. **Utilize computer software.**
   Learning Objectives
   Demonstrate ESD and Electrical Safety Practices
   Use Office Suite Software
   Incorporate Scheduling Software
   Demonstrate the Use of DeviceNet, Ethernet or ModBus Communications

8. **Utilize mechanical drives.**
   Learning Objectives
   Use Belt Drives
   Use Pulleys
   Utilize Belt Tensioning Techniques

9. **Use mechanical breaking.**
   Learning Objectives
   Analyze Breaks
   Select Breaking Type for Selected Project
   Analyze Clutch Needs for Selected Project
   Select Clutch Type

10. **Incorporate mechanical maintenance.**
    Learning Objectives
    Use Alignment Tools
11. **Incorporate linear bearings.**
   Learning Objectives
   Identify Linear Bearings Types as They Pertain to Selected Project
   Select Linear Bearings
   Use Linear Bearings in Selected Project

12. **Explain mechanical vibration.**
   Learning Objectives
   Identify Unbalanced System
   Explain Acceleration as it Pertains to Selected Project
   Explain Velocity as it Pertains to Selected Project
   Correct Unbalanced System

13. **Identify input and output requirements.**
   Learning Objectives
   Identify Open Collector Circuit
   Identify Current Sourcing and Current Sinking
   Calculate Input and Output Needs
   Develop Schematic Circuit Drawings

14. **Identify Programmable Logic Controller (PLC) guidelines.**
   Learning Objectives
   Select Programmable Logic Controller (PLC)
   Define PLC System Outcomes
   Use PLC Instructions
   Identify PLC Scan Rate

15. **Implement Programming Language to PLC.**
   Learning Objectives
   Document System Considerations
   Use Contacts and Coils
   Use Timers
   Use Counters
   Use Special Function Blocks

16. **Validate project requirements.**
   Learning Objectives
   Identify Project Validation
   Demonstrate Validation Methods
   Refine Project as Compared to Requirements
   Document Project Validation Results

17. **Construct project.**
   Learning Objectives
   Explain Project Concept
   Develop Project Plan
   Gather Components from BOM

18. **Keep project research journal.**
   Learning Objectives
   Record Necessary Data Organized in a Notebook
   Arrange Information in Logical Fashion
   Assemble a Bill of Materials (BOM)

19. **Present final model / project.**
Learning Objectives
Describe Project Concept
Discuss Improvements and Gather Peer Feedback
Measure Success Based on Data verses Project Concept
Present Project Results

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

This material can be made available in alternative formats by contacting the Academic Support Center at 507-389-7222.