Western Technical College

10620154 Integration Application Capstone

Course Outcome Summary

Course Information

Description	A culminating course brings together knowledge and skills learned in prior courses to develop, produce, and troubleshoot a capstone project.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	4
Total Hours	144

Textbooks

No textbook required.

Program Outcomes

1. Perform work safely
2. Troubleshoot electrical and mechanical systems and devices
3. Repair electrical and mechanical systems
4. Communicate Technical Information
5. Integrate electrical and mechanical systems and devices

Course Competencies

1. Perform work safely.

Assessment Strategies

1.1. Project

Criteria

You will know you are successful when

1.1. you follow Lock-out Tag-out safety procedures and practices to ensure proper start-up and shutdown of equipment.
1.2. you follow Personal Protective Equipment requirement.
1.3. you follow established safety policies and practices (e.g. OSHA, site specific).

Learning Objectives

1.a. Follow industry safety standards.

1.b. Follow Western Technical College safety standards.
1.c. Wear correct personal protective equipment (PPE).
1.d. Comply with applicable OSHA and ANSI standards for industrial equipment.

2. Design a project that integrates mechanical and automation devices and systems.

Assessment Strategies

2.1. Project

Criteria

You will know you are successful when

2.1. you submit a project proposal that meets class criteria.
2.2. you verify the project's PLC program meets expectations as stated by the proposal.
2.3. you verify the project's touchscreen program meets expectations as stated by the proposal.
2.4. you verify the project's motion control meets expectations as stated by the proposal.
2.5. you verify the project's function and application meets expectations as stated by the proposal.

Learning Objectives

2.a. Create project proposal for review.
2.b. Identify function and application of project.
2.c. Incorporate a PLC to control your project.
2.d. Incorporate a touchscreen for user interface with your project.
2.e. Incorporate at least two axis of motion control within your project.

3. Build project according to design specifications.

Assessment Strategies

3.1. Project

Criteria

You will know you are successful when

3.1. you develop a program that uses an industry based control software.
3.2. you develop a program that uses an industry based touchscreen software.
3.3. you determine sensors and implementation criteria.
3.4. you use industry based communication protocols.
3.5. you determine the mechanical system to use.
3.6. you design the mechanical system.
3.7. you implement the mechanical system.

Learning Objectives

3.a. Incorporate sensors as needed.
3.b. Develop program for PLC.
3.c. Develop program for touchscreen.
3.d. Create communications network to incorporate all aspects of project.
3.e. Design and build any mechanical systems needed for project.

4. Integrate electrical and mechanical systems and devices.

Assessment Strategies

4.1. Project

Criteria

You will know you are successful when

4.1. you identify required communication protocols.
4.2. you configure electronic equipment for data communication compatibility.
4.3. you configure sensors, controls and actuators for system compatibility.
4.4. you install required communications infrastructure.
4.5. you verify communications between systems and devices.

Learning Objectives

4.a. Integrate I/O devices.
4.b. Identify communication protocols.
4.c. Build the wiring interface cables and devices.

4.d. Use functional protocols to communicate between devices.
4.e. Develop product flow through project.
4.f. Identify and integrate fluid power systems.
4.g. Integrate the motion control systems.

5. Troubleshoot electrical and mechanical systems and devices.

Assessment Strategies

5.1. Project

Criteria

You will know you are successful when

5.1. you verify proper operation or problem.
5.2. you identify the cause of the problem: mechanical, electrical.
5.3. you determine corrective action.
5.4. you use appropriate test equipment.

Learning Objectives

5.a. Reference appropriate documentation (i.e. manuals) for equipment.
5.b. Identify root cause (electrical or mechanical).
5.c. Use correct test equipment to analyze the potential problem.
5.d. Triage possible issues.

6. Repair electrical and mechanical systems.

Assessment Strategies

6.1. Project

Criteria

You will know you are successful when

6.1. you use tools appropriate to the electromechanical field.
6.2. you select replacement components.
6.3. you configure replacement components.
6.4. you install replacement components.
6.5. you validate system performance.

Learning Objectives

6.a. Use results from triage to establish order of repairs.
6.b. Determine if you fix or replace components.
6.c. Repair components to industry standards.
6.d. Replace components based on evaluation.
6.e. Determine if repair or replacement resolved the problem.

7. Document the operation and design of the project.

Assessment Strategies

7.1. Project
7.2. Operation Manual

Criteria

You will know you are successful when

7.1. you write an operational manual for project.
7.2. you copy control program into manual.
7.3. you copy touchscreen program into manual
7.4. you provide a parts list for project.
7.5. you develop a safety section for manual.
7.6. you include a table of contents for the manual.
7.7. you include all appropriate labels, terminology, and program remarks.

Learning Objectives

7.a. Create operational manual for project.
7.b. Create ladder diagram for project.
7.c. Incorporate PLC program.

7.d. Incorporate touchscreen.
7.e. Create parts list for project.
7.f. Create safety section for manual.

8. Communicate technical information.

Assessment Strategies

8.1. Project

Criteria

You will know you are successful when

8.1. you interpret documentation of electromechanical devices and systems.
8.2. you use field specific technical terminology in speaking and writing.
8.3. you create electro-mechanical diagrams.
8.4. you document problems and solutions.
8.5. you interpret electro-mechanical diagrams.

Learning Objectives

8.a. Apply and interpret industry standard terminology.
8.b. Apply and interpret industry standard symbols.
8.c. Locate technical information and resources.
8.d. Interpret technical information and resources.
8.e. Identify and validate online reference material.
8.f. Use industry standard terminology when communicating.