Western Technical College

10620149 Electromechanical Applications

Course Outcome Summary

Course Information

Description	A culminating course in Electromechanical Technology which 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	3.00
Total Hours	108.00

Types of Instruction

Instruction Type	Credits/Hours
Lab	3 CR / 108 HR

Course History

Last Approval Date	8/25/2015

Pre/Corequisites

Prerequisite Corequisite(s); 10620112 Fluid Power Fundamentals; 10620140 Electromechanical Systems; 10620144 Mechanical Drives

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Scientific calculator (recommend T1-36x Solar). **Vendor:** Campus Shop. Required.

Core Abilities

1. **Apply mathematical concepts.**
   Status *Active*

2. **Demonstrate ability to think critically.**

Status *Active*

3. Demonstrate ability to value self and work ethically with others in a diverse population.
Status *Active*

4. Make decisions that incorporate the importance of sustainability.
Status *Active*

5. Transfer social and natural science theories into practical applications.
Status *Active*

6. Use effective communication skills.
Status *Active*

7. Use technology effectively.
Status *Active*

Program Outcomes

1. Perform work safely
Type *TSA* ***Status*** *WIP*

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

2. Troubleshoot electrical and mechanical systems and devices
Type *TSA* ***Status*** *WIP*

Criteria
2.1. Verify proper operation or problem
2.2. Identify the cause of the problem: mechanical, electrical
2.3. Determine corrective action
2.4. Utilize appropriate test equipment

3. Repair electrical and mechanical systems
Type *TSA* ***Status*** *WIP*

Criteria
3.1. Utilize tools appropriate to the electromechanical field
3.2. Select replacement components
3.3. Configure replacement components
3.4. Install replacement components
3.5. Validate system performance

4. Communicate Technical Information
Type *TSA* ***Status*** *WIP*

Criteria
4.1. Interpret documentation of electro-mechanical devices and systems
4.2. Use field specific technical terminology in speaking and writing
4.3. Create electro-mechanical diagrams
4.4. Document problems and solutions
4.5. Interpret electro-mechanical diagrams

5. Integrate electrical and mechanical systems and devices

Type *TSA* ***Status*** *WIP*

Criteria

5.1. Identify required communication protocols
5.2. Configure electronic equipment for data communication compatibility
5.3. Configure sensors, controls and actuators for system compatibilit
5.4. Install required communications infrastructure
5.5. Verify communications between systems and devices

Course Competencies

1. Design an electromechanical project that meets the instructors outlined criteria.

Domain *Cognitive* ***Level*** *Creating* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Perform work safely
Troubleshoot electrical and mechanical systems and devices
Repair electrical and mechanical systems
Communicate Technical Information
Integrate electrical and mechanical systems and devices

Assessment Strategies

1.1. skill demonstration
1.2. presentation
1.3. written product

Criteria

You will know you are successful when:

1.1. project meets all required elements
1.2. project is completed on time
1.3. project is approved by instructor before starting construction
1.4. you can give explanation for all decisions made

Learning Objectives

1.a. Investigate components needed for the project.
1.b. Design a control circuit that meets industry standards.
1.c. Design a power circuit that meets indurstry standards.
1.d. Design functional electrical layout approved by instructor.
1.e. Design mechanical layout approved by instructor.
1.f. Design programs that meet project needs.

2. Construct approved electromechanical project.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.

Use technology effectively.

Linked Program Outcomes
Perform work safely
Troubleshoot electrical and mechanical systems and devices
Repair electrical and mechanical systems
Communicate Technical Information
Integrate electrical and mechanical systems and devices

Assessment Strategies
2.1. skill demonstration
2.2. presentation
2.3. written product

Criteria

You will know you are successful when:

2.1. you construct project according to approved design
2.2. you complete project by assigned deadlines
2.3. you present completed project to the advisory committee
2.4. you give explanation of all decisions made

Learning Objectives
2.a. Acquire components needed for the project.
2.b. Construct a control circuit that meets industry standards.
2.c. Construct a power circuit that meets indurstry standards.
2.d. Construct functional electrical system approved by instructor.
2.e. Fabricate mechanical system approved by instructor.
2.f. Develop programs that meet project needs.

3. Demonstrate safe work practices according to industry standards.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities
Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes
Perform work safely

Assessment Strategies
3.1. skill demonstration

Criteria

You will know you are successful when:

3.1. you follow Lock-out Tag-out safety procedures and practices to ensure proper start-up and shutdown of equipment
3.2. you use Personal Protective Equipment as required
3.3. you follow established industry safety policies and practices (e.g. OSHA, site specific)
3.4. you follow all facility and material safety policies and practices as outlined by the instructor

Learning Objectives
3.a. Demonstrate Lock-out Tag-out safety procedures and practices while completing project.
3.b. Utilize appropriate personal protective equipment.
3.c. Follow established safety policies and practices (e.g. OSHA, site specific).
3.d. Demonstrate safe use of all equipment, materials and supplies.
3.e. Follows safety rules for material acquisition, fabrication, handling, storage and disposal.
3.f. Follows general safety rules for electrical and electronic construction.

4. Troubleshoot electrical systems and devices.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Troubleshoot electrical and mechanical systems and devices
Integrate electrical and mechanical systems and devices

Assessment Strategies

4.1. skill demonstration
4.2. presentation
4.3. written product

Criteria

You will know you are successful when:

4.1. you verify proper operation
4.2. you identify the electrical cause of the problem
4.3. you determine options to correct the problem
4.4. you utilize appropriate test equipment

Learning Objectives

4.a. Perform system power supply verification at each level of voltage.
4.b. Apply Ohm's Law to system troubleshooting.
4.c. Select appropriate test equipment.
4.d. Utilize appropriate test equipment.
4.e. Interpret electrical prints to troubleshoot electrical systems.
4.f. Verify I/O.
4.g. Verify network communications.

5. Trouble shoot mechanical devices and systems.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Perform work safely
Troubleshoot electrical and mechanical systems and devices
Integrate electrical and mechanical systems and devices

Assessment Strategies

5.1. skill demonstration
5.2. presentation
5.3. written product

Criteria

You will know you are successful when:

5.1. you verify proper operation
5.2. you identify the mechanical cause of the problem
5.3. you determine options to correct the problem
5.4. you utilize appropriate test equipment

Learning Objectives

5.a. Select appropriate test equipment.
5.b. Utilize appropriate test equipment.
5.c. Interpret mechanical prints to troubleshoot mechanical systems.
5.d. Verify mechanical operation.

6. Repair electrical systems.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Perform work safely
Repair electrical and mechanical systems
Communicate Technical Information

Assessment Strategies

6.1. skill demonstration
6.2. presentation
6.3. written product

Criteria

You will know you are successful when:

6.1. you utilize 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 verify system performance

Learning Objectives

6.a. Repair system power supply at each level of voltage.
6.b. Select appropriate equipment for repair.
6.c. Utilize appropriate equipment for repair.
6.d. Access appropriate documentation as needed for the repair.
6.e. Verify system repair(s).

7. Repair mechanical systems.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Perform work safely
Repair electrical and mechanical systems
Communicate Technical Information

Assessment Strategies

7.1. skill demonstration
7.2. presentation
7.3. written product

Criteria

You will know you are successful when:

7.1. you utilize tools appropriate to the electromechanical field
7.2. you select replacement components
7.3. you configure replacement components
7.4. you install replacement components
7.5. you verify system performance

Learning Objectives

7.a. Select appropriate equipment for repair.
7.b. Utilize appropriate equipment for repair.
7.c. Access appropriate documentation as needed for repair.
7.d. Verify system repair(s).

8. Demonstrate communication of technical information consistent with industry and instructor standards.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Perform work safely
Communicate Technical Information

Assessment Strategies

8.1. skill demonstration
8.2. written product
8.3. presentation

Criteria

You will know you are successful when:

8.1. you interpret documentation of electro-mechanical devices and systems
8.2. you use acceptable technical terminology in speaking and writing
8.3. you create electro-mechanical diagrams
8.4. you give presentation to audience, meeting all criteria outlined by instructor

Learning Objectives

8.a. Interpret documentation of electro-mechanical devices and systems.
8.b. Use field specific technical terminology in speaking and writing.
8.c. Create electro-mechanical diagrams.
8.d. Document problems and solutions.
8.e. Interpret electro-mechanical diagrams.
8.f. Present completed project to select audience.
8.g. Create daily log as outlined by instructor.
8.h. Create user manual for the project as outlined by the instructor.

9. Demonstrate integration of electrical and mechanical systems and devices.

Domain *Psychomotor* ***Level*** *Adapting* ***Status*** *Active*

Linked Core Abilities

Apply mathematical concepts.
Demonstrate ability to think critically.
Demonstrate ability to value self and work ethically with others in a diverse population.
Make decisions that incorporate the importance of sustainability.
Transfer social and natural science theories into practical applications.
Use effective communication skills.
Use technology effectively.

Linked Program Outcomes

Perform work safely
Integrate electrical and mechanical systems and devices

Assessment Strategies

9.1. skill demonstration
9.2. presentation
9.3. written product

Criteria

You will know you are successful when:

9.1. you identify required communication protocols
9.2. you configure electronic equipment for data communication compatibility
9.3. you configure sensors, controls and actuators for system compatibility
9.4. you install required communications infrastructure
9.5. you verify communications between systems and devices

Learning Objectives

9.a. Configure sensors, controls and actuators for system compatibility.
9.b. Install required communications infrastructure.
9.c. Verify communications between systems and devices.
9.d. Verify system integration.
9.e. Fix any problems with system integration.
9.f. Present overview of system integration to select audience.