Eastern WV Community & Technical College
Master Course Record

Course Prefix and Number: ELM 110
Course Title: Electrical Machine Control
Recommended Transcript Title: Electrical Machine Control
Date Approved/Revised: November 2, 2007
Credit Hours: 3 **Contact hours per week (Based on 15 week term):** **Lecture:** 2 **Lab:** 2
Prerequisite: **Corequisite:** **Pre/Corequisite:** ELM 106 – AC Electrical Circuits or consent of the Academic Program Director for Industrial Technologies.
Grading Mode: Letter grade
Catalog Description: This course introduces the student to the concepts, design and function of electrical control systems for machines and processes. Control devices used for motor starting, speed control, pressure control, temperature control, time control and count control will be covered. The development, design and use of relay logic, ladder control and wiring diagrams will be emphasized. The construction and operation of AC and DC motors will also be studied.
Course Outcomes: 1. Discuss the function of control transformers. 2. Explain the operation of control transformers. 3. Explain the turns-ratio of a control transformer. 4. Define transformer regulation. 5. Draw connection diagrams for various control transformers. 6. Calculate the sizing of a control transformer. 7. Identify various types of fuses and their operation. 8. Identify various types of circuit breakers and their operation. 9. Define interrupting capacity. 10. Identify various operators for push-button switches. 11. Explain the various types and operation of push-button switches. 12. Explain the various types and operation of selector switches. 13. Identify various types of indicator lights. 14. Explain the operation of a membrane switch. 15. Define the function of various types of relays. 16. Explain the operation of control relays. 17. Explain the operation of timing relays. 18. Discuss the operation of a latching relay. 19. Define the function of a contactor. 20. Explain the operation of a contactor. 21. Define the function of a solenoid.

22. Explain the operation of a solenoid
23. Explain the operation of a solenoid-operated directional control valve.
24. Explain the difference between an open-loop and closed-loop control system.
25. Define proportional control.
26. Define the function of various types of motion and position sensors.
27. Explain the operation of various types of motion and position sensors.
28. Define the function of various types of pressure sensors and switches.
29. Explain the operation of various types of pressure sensors and switches.
30. Define the function of various types of temperatures sensors and switches.
31. Explain the operation of various types of temperature sensors and switches.
32. Discuss the operation of temperature controllers.
33. Describe various methods and devices used for time control.
34. Describe various methods and devices used for count control.
35. Describe the operation and types of single-phase (1-ϕ) electric motors.
36. Describe the operation and types of three-phase (3-ϕ) electric motors.
37. Explain how to reverse the direction of rotation of 1-ϕ and 3-ϕ electric motors.
38. Define the design and operation of motor starters.
39. Explain the operation of various types of motor starters.
40. Design a control schematic using relay logic and using proper graphic symbols.
41. Discuss the major segments of a Programmable Logic Controller (PLC).
42. Describe the function of PLC's.
43. Describe the difference between a PLC program and a control schematic using relay logic.
44. Convert a relay logic schematic into a PLC program.
45. Design a basic PLC program.

Implementation Cycle: Spring

Role in College Curriculum:

□ **General Education Core**

Ξ**Technical Core:** Electromechanical Technology

□ **Restricted Elective**

□ **General Elective**

□ **Workforce Education**

□ **Other**

Course Fee: Yes

Instructor's Qualifications: BS Engineering/Technology or related discipline and/or expertise and experience in the field.

Expanded Course Description:

This course introduces the student to the concepts, design and function of electrical control systems for machines and processes. Control devices used motor starting, speed control, pressure control, temperature control, time control and count control will be covered. The development, design and use of relay logic, ladder control and wiring diagrams will be emphasized. The construction and operation of AC and DC motors will also be studied.

Prepared by:

Name, Title Date

Approved Per LOT Minutes

Dean, Academic and Student Services Date