



BAKER COLLEGE
STUDENT LEARNING OUTCOMES

MATT 2110 Industrial Controls
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Examine the concepts of industrial control systems.
 - a. Explore safety with electrical systems, PPE, BBS, AC, OSHA, MIOSHA, EC.
 - b. Explore overview of electrical circuit types.
 - c. Explore trace power flow.
 - d. Calculate power characteristics.
 - e. Investigate resistance, Ohms law, voltage, series, and parallel functions.
 - f. Apply electrical standards.
 - g. Demonstrate use of schematics, symbols and diagrams
 - h. Diagram and work with ladder logic
 - i. Safely work with electrical test equipment

2. Identify precautionary measures to be taken to prevent damage to electrical equipment.
 - a. Explain preventive and destructive measures.
 - b. Recognize hazardous locations and apply proper work precautions and follow correct working restrictions.
 - c. Apply techniques regarding electrostatic discharge.
 - d. Apply rung numbers, wire numbers, reference numbers, component naming, abbreviations, and symbols in a ladder diagram.

3. Design an electrical control circuit using control logic
 - a. Discuss the input/output decision/logic, and output devices in the appropriate locations in a ladder logic diagram
 - b. Explain the logic processes contained in a ladder logic diagram.
 - c. Define and develop ladder logic diagrams utilizing common control devices to meet specific parameters of operation (logic).
 - d. Apply appropriate testing procedures and troubleshooting methods to isolate wiring, component, and load defects.
 - e. Correct problems associated with electromechanical relay applications.
 - f. Select use of DC electrical devices: DC Generators, DC Motors, & Solenoids.
 - g. Plan for maintenance & troubleshooting, vibration.
 - h. Construct a DC generator circuit predict and verify the output changes as related to speed.
 - i. Troubleshoot an electrical control circuit using logic.
 - j. Implement an electrical control circuit using logic.

4. Apply electrical generation equipment correctly to achieve a desired result.
 - a. Apply the knowledge of DC generation to select appropriate applications, and make operational.
 - b. Apply the knowledge of AC generation to select appropriate applications, and make operational.
 - c. Distinguish between different forms of AC electrical power
 - d. Perform inspections, and location of faults.
 - e. Select proper electrical generation equipment to achieve a desired result.
 - f. Explain the impact of specifications and standardizations.
 - g. Demonstrate proficiency in use of single, three phase, electromagnetism, wiring, connections, relays, and overloads.
 5. Examine industrial electrical equipment
 - a. Interpret and design line protection
 - b. Discuss polarity, surge protection
 - c. Apply knowledge relating to transformers and contactors
 6. Review (comprehensive) industrial motor control systems
 - a. Switch boards and Panel boards, sensors
 - b. Branch circuits
 - c. Motor control centers
 - d. Feeders and Busways
 - e. Grounding
 - f. Fuses and circuit breakers
 - g. Testing and troubleshooting
 - h. Contactors and Magnetic Motor Starters (Manual operation)
 - i. Contactors and starters
 - j. Troubleshooting
 - k. NOTE: MATT 2 PUBLISHED MICHIGAN STATE REQUIREMENTS
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Big Ideas and Essential Questions

Big Ideas

- Industrial controls, testing, measurement
- Automation
- Circuits, diagrams, magnetism, resistance, polarity
- Alternating current, direct current
- Step up, step down, schematic logic
- Troubleshooting
- Industrial maintenance
- Grounding, bonding, sensors, speeds, variables, torque

Essential Questions

1. How are industrial controls used?
2. How do controls function?
3. What are the benefits, drawbacks?
4. How can operators remain safe?
5. How do I determine what materials to utilize in a control system?
6. What does a control system look like on a diagram?
7. How are appropriate resources selected and installed?
8. Who should troubleshoot and repair control systems, why?
9. What are the comprehensive functions of a complete control system?

These SLOs are not approved for experiential credit.

Effective: Fall 2017