

Louisiana Delta Community College

Academic Affairs Master Syllabus

Course Name: AUTOMATION

Course Number: IMFG 1030

Lecture hours: 30

Lab Hours: 45

Credit Hours: 3

Textbook, Author, and Publisher:

Instructor Information:

Class Location:

Course Description:

An introduction to the automation components of manufacturing. Provides hands -on experience with electrical circuits, instrumentation, Programmable Logic Controllers (PLCs), computers and how to safely use this equipment

Prerequisites: None**Co-requisites:** None**Learning Outcomes:**

On completion of this course, the student will be able to:

1. Demonstrate problem solving using basic math skills.
 - a. Demonstrate the ability to perform basic math addition and subtraction to determine how many production units are required during a shift.
 - b. Demonstrate the ability to perform basic math multiplication and division to determine how many pallets or bundles of product are required during your shift.
 - c. Demonstrate the ability to perform basic math using liquid volume units (pints, quarts, gallons and liters).
 - d. Demonstrate the ability to perform basic math using weight units (ounces, pounds, grams, and kilograms).
 - e. Demonstrate the ability to perform basic math using length units (inches, feet, millimeters, centimeters, and meters).
2. Examine an electrical circuit and perform calculations for voltage, current, and resistance using Ohm's Law.
 - a. Explain the different types of hazards associated with low voltage (under 600 Volt) electrical charges.
 - b. Describe the effects on equipment and personnel of an arc flash/blast.
 - c. Describe the various electrical circuit components and their symbols.
 - d. Explain the relationships of voltage, current, and resistance using Ohm's Law.
 - e. Differentiate the basic circuit laws for voltage, current, and resistance in series and parallel circuits.
3. Analyze an electrical drawing that contains multiple parallel branches with attached components and explain the operation.
 - a. Differentiate the basic circuit laws for voltage, current, and resistance in series, parallel, and series-parallel circuits.
 - b. Apply the laws for voltage, current, and resistance to given circuit schematics.
 - c. Describe how varying the branch resistance affects current flow in each branch as well as overall current flow.

Learning Outcomes (continued): On completion of this course, the student will be able to:

4. Analyze a control circuit with a start/stop station, auxiliary contacts, a coil, and a set of overloads.
 - a. Explain why typical control circuits use a lower voltage to control a higher voltage.
 - b. Discuss the various contact types, normally open (NO), normally closed (NC), and momentary contacts used in control relays.
 - c. Differentiate between main and auxiliary contact function in a relay controlled circuit.
 - d. Describe the operation of a relay using a small amount of current to control a large amount of current.
 - e. Explain the operation of thermal overload and magnetic overload relays and how their activation affects operation of the control circuit.
5. Describe the types of instruments used in process control.
 - a. Demonstrate the understanding of physical measurement instruments (liquid level, solids level, and weight).
 - b. Demonstrate the understanding of temperature and pressure measurement instruments.
 - c. Demonstrate the understanding of viscosity measurement instruments.
 - d. Demonstrate the ability to use physical measurement instruments.
 - e. Demonstrate the ability to use temperature and pressure measurement instruments.
 - f. Demonstrate the ability to use viscosity measurement instruments.
6. Explain instrumentation diagrams including symbols and numbering.
 - a. Demonstrate an understanding of instrumentation terms.
 - b. Demonstrate an understanding of instrumentation symbols and numbering.
 - c. Demonstrate an understanding of instrumentation diagrams.
7. List and explain the industry standards concerning instruments.
 - a. Demonstrate the understanding of the International Society for Automation (ISA) Instrumentation Symbols and Identification.
 - b. Demonstrate the understanding of the International Society for Automation (ISA) Instrumentation and Control Systems Documentation.
 - c. Demonstrate the understanding of the International Society for Automation (ISA) Instrument Loop Diagrams.
8. Analyze and explain an automatic control system.
 - a. Demonstrate an understanding of automation control system terms.
 - b. Identify and explain the parts of an automation control system and their purpose.
 - c. Demonstrate the ability to analyze a diagram of an automatic control system.
9. Show how to use the Human Machine Interface (HMI) workstation.
 - a. Demonstrate the ability to use process controls of the HMI to start and stop parts of a process.
 - b. Demonstrate the ability to select operating screens to collect process data.
 - c. Demonstrate the ability to use the HMI to troubleshoot process upsets or alarms.
10. Identify the different types of HMI devices in manufacturing environments.
 - a. Demonstrate the understanding and use of a Touchscreen HMI including navigating through process screens, function keys, and numeric keypad.
 - b. Demonstrate the understanding and use of a Robot HMI.
 - c. Demonstrate the understanding and use of a PC based command line user HMI.
11. Define the parts of a robotic system.
 - a. Demonstrate an understanding of terms used in robotic systems.
 - b. Demonstrate an understanding of the parts of a robotic system and their purpose.
 - c. Demonstrate an understanding of the types of robotics used in industry.
12. Explain how robotics is used in industrial automation.
 - a. Demonstrate an understanding of robotics used in packaging.
 - b. Demonstrate an understanding of robotics used in machine language.
 - c. Demonstrate an understanding of robotics used in welding.
 - d. Demonstrate an understanding of robotics used in hazardous environments.
13. Explain safe practices working with robotics equipment.
 - a. Demonstrate an understanding of the terms used in robot safety.
 - b. Demonstrate an understanding of the types of safety devices used in robotic systems and their purpose.
 - c. Analyze a robotic system to determine what safety devices are required.
14. Demonstrate proper use of a computer (PC) database entry system.
 - a. Demonstrate an understanding of the PC database entry system, its parts and their purpose.
 - b. Demonstrate the ability to use a database entry system by entering the end of shift production data.

Assessment Measures: To be provided by College Campus

Library Resource Center:

The Delta Library and Learning Resource Center is committed to providing quality information and learning resources and services, including technology, in supporting the overall mission of Louisiana Delta Community College and its commitment to lifelong learning.

Special Accommodations:

Louisiana Delta Community College complies with Section 504 of the Rehabilitation Act, as well as the Americans with Disabilities Act. Students with disabilities who attend the Monroe campus may make a request by contacting the Director of Counseling and Disability Services (See College Directory for contact information.) at the beginning of each semester. Reasonable accommodations will be attempted for students with documented disabilities. If an impairment is identified later in the semester, a non-retroactive accommodation plan will be developed. Students at satellite campuses should contact the Coordinator of Student Affairs at their particular campus.

Title IX:

Louisiana Delta Community College is committed to protecting the rights of students, which includes compliance with Title IX requirements. As such, the institution and members of our community will not tolerate the offenses of dating violence, domestic violence, sexual assault, and stalking. Students with Title IX concerns should contact the College's Title IX Coordinator (See College Directory for contact information.) Students are required to complete Sexual Assault Awareness and Prevention Online Training. Access to this online course will be sent out through the Delta email account.

Student Code of Conduct:

Louisiana Delta Community College encourages an environment of academic integrity and mutual respect. Students should read and follow both academic and behavioral expectations identified in the Code of Student Conduct that can be found online at www.ladelta.edu. Students are expected to act with integrity, respect the rights of others, and conduct themselves in a professional manner. The Honor Code prohibits academic misconduct such as cheating, engaging in unauthorized collaboration, and plagiarism. Violations of the Code of Student Conduct may result in disciplinary action as provided in the Code. Incidents are reported through the online Student Conduct system.