



**DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.**

Course Syllabus

1. Course number and name

IE 455 Control and Industrial Automation Lab.

2. Credits and contact hours

(3+0) 3 credit hours, 3 contact hours

3. Course type

Blended Learning Course (2+1)

4. Instructor's or course coordinator's name

Dr. Mohammad Nasir

5. Textbook information

Manual of Automation Lab.

a. Other supplemental materials

- Salah Amarneh, Industrial Automation, 1st Edition, Al- Safeer printing press,
2015

6. Specific course information

a. Catalog description

The lab contains different topics related to control and automation systems: ON-OFF control, open loop and closed loop control systems, PID controller, Directional control valve types, Hydraulic systems, Pneumatic systems, Relay contactors control, PLC control of production lines.

b. Prerequisites or co-requisites

Co-requisite: IE 412 Automation.

c. The course is:

Required in Industrial Engineering program.

7. Specific goals for the course

a. Course outcomes:

After completion of the course, students are expected to be able to:

1. Differentiate between control systems types ON-OFF, open loop closed loop, sequence control systems and PID controller.
2. Understand the basic hydraulic and pneumatic control systems.



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3. Program the LOGO by using the functional block diagram and make the hardware connections.
4. Deal with a conveyor system and program it by using the PLC with a ladder logic diagram.

b. The following student outcomes are addressed by the course:

SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.

SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.

8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Differentiate between control systems types ON-OFF, open loop closed loop, sequence control systems and PID controller.	-	Lab experiment	Discussion boards
CO-(2): Understand the basic hydraulic and pneumatic control systems.	-	Lab experiment	Assignment
CO-(3): Program the LOGO by using the functional block diagram and make the hardware connections	-	Lab experiment	Project
CO-(4): Deal with a conveyor system and program it by using the PLC with a ladder logic diagram.	-	Lab experiment	Final exam
Student Outcomes			
SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare,	2	Lectures (Example and Problems)	Midterm Exam



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as well as global, cultural, social, environmental, and economic factors.			
SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.	1, 3	Term Project	Term Project- Part 2
SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.	1	Term Project	Term Project- Part 1

9. Weekly Teaching Plan

Week No.	Lab	Topic	Method of Delivery
1		Process Control: On/Off temperature control,	Laboratory experiment
2		Open loop and Closed loop systems. Pressure control system.	Laboratory experiment
3		PID controller, servo motor control	Laboratory experiment
4		Pneumatic system parts.	Laboratory experiment
5		Double acting cylinders	Laboratory experiment



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6		Directional control valve types	Laboratory experiment
7		Relays: Sensors, Actuators, timers and counters	
8		Reverse control of AC motors	
9		Logo 24 RC Hardware components	
10		Logo 24 RC FBD language	
11		PLC system: Conveyor belt system with ladder diagram	
12		PLC system: Pneumatic robot	
13		Design of experiment project	

10. Grade Distribution:



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Assessment	Grade	Week No.
- Midterm Exam	30%	7 th Week
-Assignments (Reports /Quizzes/ Home works)	30%	1-16 th Week
- Final Examination	40%	16 th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.