



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

Course Syllabus

1. Course number and name

IE 465 Control and Industrial Automation.

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

Salah Amarneh, Industrial Automation, Al-Safeer, 2015 ISBN:978-9957-8704-1-6.

a. Other supplemental materials

Instructor's notes

6. Specific course information

a. Catalog description

This course contains basic introduction to process control theory and sequence industrial automatic control systems including many topics: transfer function, block diagram, closed loop and open loop control systems, the PID controller, ON-OFF control systems, hydraulic control circuits, relay contactors control, PLC control of production lines.

b. Prerequisites or co-requisites

Co-requisite: CEE 334 Principles of electrical machines; Prerequisite: ME 463 Automatic Control Systems

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. Understand the control system types open and closed loop systems such as PID controller.



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2. Be familiar control block diagrams and P and ID diagrams.
3. Design the Relay control circuits and program PLC controllers.
4. Design Hydraulic and pneumatic systems and design conveyor belt and pumping systems.

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): Understand the control system types open and closed loop systems such as PID controller.	-	Lectures (Example and Problems)	Midterm Exam
CO-(2): Be familiar control block diagrams and P and ID diagrams.	-	Lectures (Example and Problems)	Assignment
CO-(3): Design the Relay control circuits and program PLC controllers.	-	Lectures (Example and Problems)	Final Exam
CO-(4): Design Hydraulic and pneumatic systems and design conveyor belt and pumping systems.	-	Synchronous	Project
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.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	Introduction to Control systems	Lecture
	Tue (9-10)	Introduction to control system types	Lecture
	Thu (9-10)	Interactive videos- Chapter 1	synchronous active learning
2	Sun (9-10)	Control system types	Lecture
	Tue (9-10)	Control system types	Lecture
	Thu (9-10)	Case studies	Asynchronous active learning
3	Sun (9-10)	Transfer function basics	Lecture
	Tue (9-10)	Transfer function basics	Lecture
	Thu (9-10)	Block diagram representation	Online Lecture/ synchronous
4	Sun (9-10)	Open loop systems	Lecture
	Tue (9-10)	Closed loop systems	Lecture
	Thu	Block diagram representation	Online Lecture



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	(9-10)		
5	Sun (9-10)	PID controller	Lecture
	Tue (9-10)	PID controller	Lecture
	Thu (9-10)	PID case studies	Online Lecture
6	Sun (9-10)	P and ID diagrams	Lecture
	Tue (9-10)	P and ID diagrams	Lecture
	Thu (9-10)	P and ID case studies	Online Lecture
7	Sun (9-10)	Sequence control definition	Lecture
	Tue (9-10)	Sequence control applications	Lecture
	Thu (9-10)	Case studies on sequence control systems	Online Lecture
8	Sun (9-10)	ON-OFF control systems	Lecture
	Tue (9-10)	Relay device	Lecture
	Thu (9-10)	Case studies on ON-OFF control systems	Online Lecture
9	Sun (9-10)	Timer device	Lecture
	Tue (9-10)	Counter device	Lecture
	Thu (9-10)	Designing relay control systems examples	Online Lecture
10	Sun (9-10)	Pumping systems	Lecture
	Tue (9-10)	Pumping systems	Lecture
	Thu (9-10)	Examples	Online Lecture
11	Sun (9-10)	Conveyer systems	Lecture
	Tue (9-10)	Conveyer systems	Lecture
	Thu (9-10)	Examples	Asynchronous active learning



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12	Sun (9-10)	Hydraulic and pneumatic systems	Lecture
	Tue (9-10)	Hydraulic and pneumatic systems	Lecture
	Thu (9-10)	Examples of Hydraulic and pneumatic systems	Synchronous active learning
13	Sun (9-10)	Introduction to PLC	Lecture
	Tue (9-10)	Introduction to PLC	Lecture
	Thu (9-10)	Case studies	synchronous active learning
14	Sun (9-10)	PLC programming languages	Lecture
	Tue (9-10)	PLC programming languages	Lecture
	Thu (9-10)	Examples	synchronous active learning
15	Sun (9-10)	Design PLC based control system	Lecture
	Tue (9-10)	Design PLC based control system	Lecture
	Thu (9-10)	Case study and project presentations	synchronous active learning

10. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7 th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works)	20%	1-16 th Week
- Final Examination	50%	16 th Week

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