

# The University of Jordan



Faculty of Engineering & Technology, Mechanical Engineering Department

Design of Hydraulic and Pneumatic Systems Lab (1) (914518)

Fall 2022

## 2005 Course Catalog

The objective of this course is to familiarize student with fluid power systems design control and operation. It covers the fundamentals of fluid power components and circuits. Hydraulic, Pneumatic and Electro-Hydraulics-Pneumatics are used to create a hands-on experience for the students. Finally, Programmable Logic Controllers (PLCs) are engineered to integrate Pneumatics with sequence control.

### Course

<b>Name &amp; number</b>	Design of Hydraulic and Pneumatic Systems Lab (1) (914518)
<b>Credits and contact hours</b>	1 credits / One lab each week for 3hrs
<b>Course Prerequisites</b>	
<b>Prerequisites by topic</b>	Basic theory of fluid mechanics, basic theory of control, system dynamics, solutions to differential equation, and Linearization techniques
<b>Prerequisites by course</b>	0904418 or 0908441
<b>Co-requisites by course</b>	-
<b>Prerequisite for</b>	None

### Instructors

Name	E-mail	Section	Office Hours	
			Sun/Tue/Thu	Mon/Wed
Dr. Musa Abdalla	<a href="mailto:m.abdalla@ju.edu.jo">m.abdalla@ju.edu.jo</a>	1	TBA	TBA

### Text Books

	Text book 1	Text book 2
<b>Title, Author(s)</b>	Fluid Power with Applications, a. Anthony Esposito.	(Handouts)
<b>Publisher, Year, Edition</b>	Prentice Hall. [Latest edition]	-

### References

<b>Books, Author(s)</b>	<ul style="list-style-type: none"> <li>• Basic Hydraulics Laboratory Manual, LabVolt [Reference Manual]</li> <li>• Basic Pneumatics Laboratory Manual, Botsch [Reference Manual]</li> </ul>	
<b>Journals</b>		
<b>Internet links</b>	<a href="http://fetweb.ju.edu.jo/staff/ME/JuTech">http://fetweb.ju.edu.jo/staff/ME/JuTech</a>	

### Measurable Student Outcomes (MSO) and Course Outcomes

MSO	Course Outcomes
MSO2+MSO3	1. Ability to perform Pneumatic and Hydraulic basic circuits design
MSO5	2. Ability to analyze pneumatic and hydraulic systems
MSO5	3. Ability to read pneumatic and Hydraulic schematics
MSO3	4. Understand the different types of valves used in fluid power
MSO3	5. Understand the different types of actuators and motors that are used in fluid power
MSO5	6. Design and analyze fluid power sequence control
MSO3	7. Perform steady state and dynamical analysis for hydraulics systems
MSO4	8. Know about PID pneumatic based controllers
MSO9	9. Use simulating software by Automation studio for design and analysis
MSO1	10. Apply Fluid and Control knowledge in analysis and design

### Topics Covered

Week	Topics	Chapters in Text
1	Introduction to Fluid Powers and Terminologies and notations Hydraulic fluid properties and Fluid dynamics (Video)	
2	Automation Studio	
3	Hydraulics Exp1	
4	Hydraulics Exp2	
5	Electro-Hydraulics Exp3	
6	Pneumatics Exp1	
7	Pneumatics Exp2	
8	Electro-Pneumatics Exp3	
9	Electro-Pneumatics Exp4	
10-16	Pneumatics and PLC based Project	

### Evaluation

Assessment Tool	Expected Due Date	Weight
<b>Pre-Lab</b>	before experiment: Automation Studio	10%
<b>Lab and Reports</b>	Min seven experiments	15%
<b>Midterm Exam</b>	According to the department schedule	25 %
<b>Final Exam + Project in Lab</b>	According to the University final examination schedule	50 %

### Contribution of Course to Meeting the Professional Component

The course contributes to build the fundamentals in using Pneumatic and Hydraulic (Fluid Power) in mechanical and industrial systems. The students build knowledge and skill needed whenever they are encountered with such systems in industrial factories and plants.

#### Relationship to Program Outcomes (%)

PO #	1	2	3	4	5	6	7	8	9	10
%	40	100	80	20	80	0	0	0	80	0

#### Relationship to Mechanical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO 4	PEO 5
√	√	√	√	

Prepared by: Dr. Musa Abdalla, September, 2022