

**The University of Jordan
School of Engineering**



Department	Course Name	Course Number	Semester
Mechanical Engineering	Design of Hydraulic and Pneumatic Systems Lab	0914518	2023 Fall

2005 Course Catalog Description

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.

Instructors

Name	E-mail	Sec	Office Hours		Lecture Time	
			Su, Tue, Thu	Mon, We,	Su., Tue, Thu	Mon, We
Dr. Musa Abdalla	m.abdalla@ju.edu.jo	1	TBA	TBA		

Text Books

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

References

Books	1. Basic Hydraulics Laboratory Manual, LabVolt [Reference Manual] 2. Basic Pneumatics Laboratory Manual, Botsch [Reference Manual]
Journals	
Internet links	http://fetweb.ju.edu.jo/staff/ME/JuTech

Prerequisites

Prerequisites by topic	-
Prerequisites by course	Design of Hydraulic and Pneumatic Systems (0914537)
Co-requisites by course	-
Prerequisite for	-

Topics Covered

Week	Topics	Chapter in Text	Sections
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		

Mapping of Course Outcomes to ABET Student Outcomes							
SOs	Course Outcomes						
1	Apply Fluid and Control knowledge in analysis and design						
2	Ability to perform Pneumatic and Hydraulic basic circuits design						
2	1. Understand the different types of valves used in fluid power 2. Understand the different types of actuators and motors that are used in fluid power 3. Perform steady state and dynamical analysis for hydraulics systems						
2, 6	Know about PID pneumatic based controllers						
6	1. Ability to analyze pneumatic and hydraulic systems 2. Ability to read pneumatic and Hydraulic schematics 3. Design and analyze fluid power sequence control						
2, 6	Use simulating software by Automation studio for design and analysis						
Evaluation							
Assessment Tools		Expected Due Date					Weight
Pre-Lab		Before experiment: Automation Studio					10 %
Lab and Reports		Min seven experiments					15%
Midterm Exam		According to the department schedule					25 %
Final Exam + Project in Lab		According to the University final examination schedule					50 %
Contribution of Course to Meet the Professional Components							
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 Student Outcomes							
SOs	1	2	3	4	5	6	7
Availability		√			√	√	
Relationship to Mechanical Engineering Program Objectives (MEPOs)							
MEPO1		MEPO2			MEPO3		
H		M					

ABET Student Outcomes (SOs)	
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
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
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
Updated by Prof. Musa Abdalla, 2024	