

## Faculty of Engineering & Technology

### **Fluid Systems Control**

Information :

Course Code :	MPR 479	Level	:	Undergraduate	Course Hours :	3.00- Hours

**Department :** Specialization of Mechatronics Engineering

### Instructor Information :

Title	Name	Office hours
Professor	Abdelaziz Morgan Abdelaziz Ahmed	9
Assistant Lecturer	Moustafa Raafat Aziz Shousha	
Assistant Lecturer	Rana Mohamed Abdel Rahman Saleh	8

### Area Of Study :

Bytheendofthecoursethestudentswillbeableto:

- 1) Understand fundamentals of Fluid Mechanics
- 2) Apply the fundamental principles of Fluid Mechanics
- 3) Explore the fundamental principles of Fluid Mechanics through experimentation
- 4) Develop skills for analyzing experimental data and working in teams

5) Share ideas and work in a team.

The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through application and analysis of realistic system data.

#### Course outcomes :

a.Knowledge and Understanding: :			
1 -	Identifybasicappliedand engineeringscience.		
2 -	Identify principles in the of design of mechanical components, differentmaterials, and manufacturing technologies in the field of mechanical power engineering and some other engineering disciplines.		
3 -	Identify principles in the fieldofdesignoffluidflow, thermodynamics,gasdynamics,turbo-machinery, heattransferengineering and fundamentals of thermal and fluid processes		
4 -	Develop conceptual and detailed design of construction projects and fluid power systems		
b.Intellectu	al Skills: :		
1 -	Define the mechanical powerengineering problems and evaluate designs, processes, and performance and propose improvements.		
2 -	Derivedifferentsolutionalternativesfortheengineeringproblems, analyze, interpret data and design experiments to obtain new data, and evaluate the power losses in the fluid transmission lines and networks		
3 -	Analyze the performance of the basic types of internal combustion engines, hydraulic machines, fluid power systems, subsystems and various control valves and actuators.		

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## c.Professional and Practical Skills: :

1 -	Use laboratory, workshop e4quipment and field devices competently and safely.		
2 -	Analyze the record data in the laboratory.		
3 -	Prepare engineering drawings, computer graphics, and write specialized technical reports.		
4 -	- Write computerprograms pertaining to mechanical powerandenergy engineering to describe the basic thermal and fluid processes mathematically, and use the computer software for their simulation and analysis		
d.General a	nd Transferable Skills: :		
1 -	Collaborate effectively within multidisciplinary team.		
2 -	Share ideas, communicate effectively and work in stressful environmentand within constraints.		
3 -	Lead and motivate individuals and work with others according to the rules of the professional Ethics.		
4 -	Use digital libraries and/or Learning systems and demonstrate efficient IT capabilities		

## **Course Topic And Contents :**

Торіс	No. of hours	Lecture	Tutorial / Practical
Introduction and Basic Concepts History of Fluid Mechanics, No-slip condition, Classification of fluid flows.	4	2	2
Fluid Properties, Vapor pressure and Cavitation, Compressibility and speedof sound, Viscosity,Surface tension and capillary effect.	4	2	2
Pressure and Fluid Statics Hydrostatic Forces on Submerged PlaneSurfaces, Hydrostatic Forces on Submerged CurvedSurfaces, Buoyancy and Stability.	4	2	2
Fluid Kinematics Lagrangian and Eulerian Descriptions, Flow Patterns and Flow Visualization, Vorticity and Rotationality.	4	2	2
Mass, Bernoulli, and Energy Equations Mechanical Energy and Efficiency, The Bernoulli Equation.	4	2	2
Mass, Bernoulli, and Energy Equations General Energy Equation, Energy Analysis of Steady Flows.	4	2	2
Fluid Momentum Newton <b>g</b> Laws, The Linear Momentum Equation.	4	2	2
Internal Flow Introduction, Laminar and Turbulent Flows, The Entrance Region, Laminar Flow in Pipes, Turbulent Flow in Pipes, Minor Losses.	8	4	4



# Course Topic And Contents :

Торіс	No. of hours	Lecture	Tutorial / Practical
Internal Flow Piping Networks and Pump Selection, Flow rate and velocity measurement.	4	2	2
Introduction, Drag and Lift, Friction and Pressure Drag, Drag Coefficients of Common Geometries, Parallel Flow Over Flat Plates, Flow Over Cylinders and Spheres, Lift.	8	4	4

Teaching And Learning Methodologies :		
Lectures		
Tutorial		
Class discussions and activities		
Homework and self-study		

# Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
1 st -Mid-term examination	25.00	6	
2 nd -Mid-term examination	25.00	11	
Final Exam	40.00	16	
Quizzes	10.00	4	

Recommended	books :
Fluid Mechanics	6E, By Douglas, Gassiorik and Swaffield, Publisher: Pearson,