

**Faculty of Engineering & Technology**

**Mechanical Mechanisms**

**Information :**

**Course Code :** MAN 311

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Mechanical Engineering

**Instructor Information :**

Title	Name	Office hours
Lecturer	Hassan Mohamed Shams Eldin Elsayed Eleashy	6
Lecturer	Arafa Soliman Sobh Khalil Arafa	1
Teaching Assistant	Fady Ayman Mohamed Naguib Mahmoud Noah	2
Teaching Assistant	Abdelrahman Mohamed Mokhtar Khaled Eid Mubark	

**Area Of Study :**

- Know and understand position, displacement, velocity and acceleration for any mechanism.
- Know and understand the types of standard cam and equivalent mechanisms.
- Know and understand the kinematics of gear train and force analysis of mechanisms and applications to engine balancing machines.

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.

**Description :**

Kinematics Fundamentals: geometry of motion and mechanism topology, Linkage mechanisms and planar robots: position, displacement, velocity, and acceleration (Graphical, Analytical and Computers Assisted Methods), Cam-follower mechanisms: design and analysis (Graphical, Analytical and Computers Assisted Methods), Standard cams and equivalent mechanisms, Kinematics of gear trains: gears terminology, simple, compound, and planetary gear trains, Dynamics fundamentals: force analysis of mechanisms, Applications to engine balancing machines, Applications and use of Computers for Mechanism Simulation and Animation.

**Course outcomes :**

**a. Knowledge and Understanding: :**

1 -	Identify basic applied and engineering science.
2 -	Identify principles in the of design of mechanical components, different materials, and manufacturing technologies in the field of mechanical power engineering and some other engineering disciplines.
3 -	Identify principles in the field of design of fluid flow, thermodynamics, gas dynamics, turbo- machinery, heat transfer engineering and fundamentals of thermal and fluid processes
4 -	Develop conceptual and detailed design of construction projects and fluid power systems.

**b. Intellectual Skills: :**

1 -	Define the mechanical power engineering problems and evaluate designs, processes, and performance and propose improvements.
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2 -	Derive different solution alternatives for the engineering problems, 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. Analyze the solution alternatives and choose the optimum one.
4 -	Creative thinking.

**c. Professional and Practical Skills: :**

1 -	Use laboratory, workshop equipment 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 computer programs pertaining to mechanical power and energy engineering to describe the basic thermal and fluid processes mathematically, and use the computer software for their simulation and analysis.

**d. General and Transferable Skills: :**

1 -	Collaborate effectively within multidisciplinary team.
2 -	Share ideas, communicate effectively and work in stressful environment and 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 :**

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to kinematics Fundamentals.	4	2	2
Geometry of motion and mechanism topology, Linkage mechanisms and planar. robots	4	2	2
Velocity and acceleration of any point on linkage for a plane motion.	8	4	4
Equilibrium and force analysis.	8	4	4
Cam-follower mechanisms: design and analysis (Graphical, Analytical and Computers Assisted Methods).	8	4	4
Analysis of some standard cams and equivalent mechanisms.	4	2	2
Kinematics of gear trains: gears terminology, simple, compound, and planetary gear trains	4	2	2
Dynamics fundamentals: force analysis of mechanisms.	8	4	4
Balancing of rotating masses.	4	2	2
Applications to engine balancing machines- In-line Engine	4	2	2
Applications to engine balancing machines- Radial Engine	4	2	2

**Teaching And Learning Methodologies :**

Lectures
Tutorials
Presentation & Discussion
Brain storming

**Course Assessment :**

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