

**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	4
Lecturer	Sherif Abdelrahman Abdelrahman Elatriby	
Assistant Lecturer	ALAA MOHAMMED ABDULLAH AHMED	2

**Area Of Study :**

- Analyze position, displacement, velocity and acceleration for planar mechanisms.
- Define and design different types of standard cams and equivalent mechanisms.
- Explain the kinematics of gear train and force analysis of planar mechanisms and applications to engine balancing machines.

**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 -	Understand various parts involved in kinematics of machines for different applications.
2 -	Identify requirements and the design aspects of basic machine elements.
3 -	Develop an ability to design a system, component, or process to meet desired needs within realistic constraints.
4 -	Develop an ability to identify, formulate, and solve engineering problems.
5 -	Understand the fundamentals of the theory of kinematics and dynamics of machines

**b.Intellectual Skills: :**

1 -	Understand various cam motion profiles and follower mechanism, their classification and design based on the prescribed follower motion.
2 -	Understand importance gear trains and their practical applications.
3 -	Analyze the available inputs to attain the required outputs.

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

1 -	Create a schematic drawing of a real-world mechanism.
2 -	Use graphical methods to study the motion of a planar mechanism.
3 -	Use computer software to study the motion of a mechanism.
4 -	Utilize the common mechanisms used in machines and everyday life.
5 -	Apply graphical and analytical techniques for analysis of different mechanism types.

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

1 -	Use digital libraries and/or Learning systems.
2 -	Introduce ideas and solutions for many practical and engineering problems efficiently in predetermined time plan.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to kinematics Fundamentals, Geometry of motion and mechanism topology, Linkage mechanisms and planar. robots	8	4	4
Velocity and acceleration analysis of any point on linkage for a plane motion.	12	6	6
Cam-follower mechanisms: design and analysis (Graphical, Analytical and Computers Assisted Methods).	10	6	4
Analysis of some standard cams and equivalent mechanisms.	4	2	2
Kinematics of gear trains: gears terminology, simple, compound, and planetary gear trains	8	4	4
Dynamics fundamentals: force analysis of mechanisms.	4	2	2
Balancing of rotating masses.	4	2	2
Project follow -up.	4	2	2
Midterm Exams ,Quizzes	6	2	4

**Teaching And Learning Methodologies :**

Interactive Lecturing
Problem solving
Discussion
Project

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
1 st -Mid-term examination	15.00	6	Written Exam
2 nd -Mid-term examination	15.00	11	Written Exam
Assignments, Participation, & Quizzes	20.00	16	Reports follow up during tut. /lab work, & written exam.

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Final examination	40.00		Written Exam
Project.	10.00	12	Practical

**Books :**

Book	Author	Publisher
Kinematics and Dynamics of Machinery	Robert I.Norton	McGraw Hill

**Course Notes :**

Lecture notes on the course moodle page, FUE website

**Recommended books :**

Charles E. Wilson and J. Peter Sadler, "Kinematics and Dynamics of Machinery, SI Third Edition", Prentice Hall, ISBN: 0131866419, (2003)