

**Faculty of Engineering & Technology**  
**Dynamics of Rigid Bodies (Mechanics3)**

**Information :**

**Course Code :** MEC 221

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Mechanical Engineering

**Instructor Information :**

Title	Name	Office hours
Lecturer	Amr Mohamed Metwally Ismaiel	13
Lecturer	Amr Mohamed Metwally Ismaiel	13
Teaching Assistant	Amira Khaled Hasan Mohamed Elkodama	4
Teaching Assistant	Amira Khaled Hasan Mohamed Elkodama	4

**Area Of Study :**

- Recognize the fundamental principles of kinematics of a rigid body.
- Analyze the concepts of planar motion and its types (translation, rotation and general plane motion) of a rigid body or systems of connected bodies using vector and scalar methods.
- Learn how to represent and apply relations of position, velocity and acceleration for rolling motion problems.
- Study and analyze the various principles of Kinetics such as force-acceleration, work-energy and the impulse-momentum principles for various types of problems that containing the motion of a rigid body.

**Course outcomes :**

**a.Knowledge and Understanding: :**

1 -	Describe position, velocity and acceleration for a moving rigid body.
2 -	Define the equations of motion of a rigid body
3 -	Explain the analysis of work and energy, impulse and momentum methods.

**b.Intellectual Skills: :**

1 -	Discriminate between different types of motion
2 -	Formulate the kinematic and kinetic equations in order to describe the motion of the rigid body.

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

1 -	Design and perform experiments for motion studies.
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**d.General and Transferable Skills: :**

1 -	Work effectively in a team and develop the skills which are related to creative thinking, problem solver, and teamwork in different fields of the motion of rigid bodies.
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### **Course Topic And Contents :**

<b>Topic</b>	<b>No. of hours</b>	<b>Lecture</b>	<b>Tutorial / Practical</b>
Planar kinematics of a rigid body, Translation, rotation and general motion	4	2	2
Vector and scalar methods for analysis of position, velocity and acceleration	8	4	4
Analysis of a mechanism of connected rigid bodied	4	2	2
Rolling motion and applications.	4	2	2
Kinetics of a rigid body	12	2	2
Force-acceleration method of a rigid body	12	6	6
Work . Energy method of a rigid body	12	6	6
Impulse and momentum method of a rigid body and impact problems	8	4	4
Midterm Exams and Quizzes	4	2	2

### **Teaching And Learning Methodologies :**

Interactive Lecturing

Problem solving

Discussion

Research

### **Course Assessment :**

<b>Methods of assessment</b>	<b>Relative weight %</b>	<b>Week No</b>	<b>Assess What</b>
1st -Mid-term examination	15.00	6	Written exam.
2 nd -Mid-term examination	15.00	11	Written exam.
Assignments, Participation, & Quizzes	30.00		Reports follow up during tutorial & written exam.
Final examination	40.00	15	Written exam.

### **Course Notes :**

Lecture notes on the course moodle page, FUE website.

### **Recommended books :**

"Engineering Mechanics . Dynamics" , By R.C. Hibbeler Publisher: Pearson