Faculty of Engineering & Technology

Dynamics of Rigid Bodies (Mechanics3)

Information :

Course Code :	MEC 221	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Department of Structural Engineering & Construction Management

Instructor Information :

Title	Name	Office hours
Lecturer	Ahmed Mohamed Abdel Moniem Mohamed Soliman	
Teaching Assistant	Nada Mamdouh Hamam Mohamed Elshenawy	

Area Of Study :

ÅRecognize the fundamental principles of kinematics of a rigid body.

ÅAnalyze 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.
ÅLearn how to represent and apply relations of position, velocity and accelera-tion for rolling motion problems.
ÅStudy and analyze the various principles of Kinetics such as force-acceleration, work-energy and the impulse-momentum principles for various types of prob-lems that containing the motion of a rigid body

Description :

Kinematics of rigid bodies: Types of planar motion of rigid body: translation, rotation about a fixed axis and general motion. Angular velocity and angular acceleration, in-stantaneous center, relative velocity and relative acceleration. Kinetics of rigid bodies, Newton's laws, friction and elastic forces, equations of motion. Principle of work and energy. Conservation forces and principle of conservation of mechanical energy. Prin-ciple of impulse and momentum, impulsive forces, impact. Introduction of free and forced vibrations.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	a1- Describe position, velocity and acceleration for a moving rigid body
2 -	a2- Define the equations of motion of a rigid body
3 -	a3- Explain the analysis of work and energy, impulse and momentum methods
b.Intellectual Skills: :	
1 -	b1- Discriminate between different types of motion.
2 -	b2- Formulate the kinematic and kinetic equations in order to describe the motion of the rigid body.
c.Professional and Practical Skills: :	
1 -	c1- Design and perform experiments for motion studies.
d.General and Transferable Skills: :	
1 -	d1: 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

Course Topic And Contents :			
Topic	**No. of hours**	**Lecture**	**Tutorial / Practical**
Planar kinematics of a rigid body, Trans-lation, 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	4	2	2
Force-acceleration method of a rigid body	12	6	6
Work ï energy method of a rigid body	12	6	6
Impulse and momentum method of a rig-id body and impact problems	8	4	4
Midterm Exams and Quizzes	4	2	2

Course Assessment :			
Methods of assessment	**Relative weight %**	**Week No**	**Assess What**
1st Midterm	15.00		
2nd Midterm	15.00		
Assignments, Partic-ipation, & Quizzes	30.00		
Final Exam	40.00		

Course Notes :

Lecture notes on the course moodle page, FUE website.

Recommended books :

Hibbeler R.., " Engineering Mechanics: Dynamics ", 12th Edition.
Riley W. and Sturges L.., " Engineering Mechanics: Dynamics ".