

9
The University of Jordan
School of Engineering



Department	Course Name	Course Number	Semester
Mechanical Engineering	Dynamics	0904222	

2019 Course Catalog Description

Kinematics of particles, Rectilinear and curvilinear motion in various coordinate systems. Kinetics of particles, Newton's second law, Central force motion, Work-energy equation, Principle of impulse and momentum, Impact, Conservation of energy and momentum, Application to a system of particles. Kinematics of rigid bodies, Relative velocity and acceleration, Instantaneous center, Analysis in terms of a parameter. Plane kinetics of rigid bodies with application of Newton's second law, Energy and angular impulse-angular momentum.

Instructors

Name	E-mail	Sec	Office Hours	Lecture Time

Text Books

Title	Mechanics for Engineers: Dynamics	
Author(s)	R. C. Hibbeler, Kai beng Yap	
Publisher, Year, Edition	Pearson, 2016, Fourteenth Edition, (SI Units)	

References

Books	1. Ferdinand P. Beer, E Russell Johnston, William E. Clausen (2007) Vector Mechanics for Engineers; Dynamics, Eighth Edition (SI Units). McGraw Hill. 2. J. L. Meriam, L. G. Kraige (2007) Engineering Mechanics; Dynamics, Sixth Edition. John Wiley& Sons.
Journals	
Internet links	www.masterinengineering.com/support (publisher website)

Prerequisites

Prerequisites by topic	Calculus, Vector Analysis
Prerequisites by course	Statics 0901241
Co-requisites by course	-
Prerequisite for	Mechanics of Machines, Mechanical Vibration

Topics Covered

Week	Topics	Chapter in Text	Sections
1-2	Kinematics of Particles	12	1-2, 4-7, 9-10
3-4	Kinetics of Particles: Force and Acceleration	13	1-5
5-6	Kinetics of Particles: Work and Energy	14	1-6
7-8	Kinetics of Particles: Impulse and Momentum	15	1-3, 5-7
9-10	Planar Kinematics of Rigid Bodies	16	1-8
11-12	Planar Kinetics of Rigid Bodies: Force and Acceleration	17	1-5
13-14	Planar Kinetics of Rigid Bodies: Work and Energy	18	1-5
15	Planar Kinetics of Rigid Bodies: Impulse and Momentum	19	1-3

Mapping of Course Outcomes to ABET Student Outcomes							
SOs	Course Outcomes						
1	1. Studying rectilinear and curvilinear motion of particles 2. Studying relative motion using translating axes 3. Drawing free body diagram for particles and rigid bodies 4. Performing velocity and acceleration analysis of mechanisms using vector analysis approach 5. Performing angular motion analysis using scalar approach 6. Applying angular motion analysis to rigid bodies and mechanisms 7. Understanding Planar kinematics of rigid bodies (translation and rotation) 8. Studying relative motion analysis using rotating axes 9. Applying Equation of motion using Newton's second law to particles and rigid bodies 10. Formulation of motion using Work and Energy and Impulse and Momentum principles 11. Applying Force and Acceleration to planar kinetics of rigid bodies 12. Performing angular velocity analysis using instantaneous center of rotation						
Evaluation							
Assessment Tools		Expected Due Date				Weight	
First Exam						25 %	
Second Exam						20 %	
Final Exam						50 %	
Contribution of Course to Meet the Professional Components							
The course offers students the chance to build their skills in formulating and performing kinematics and kinetics analysis of particles and rigid bodies. In addition, it is needed for the higher-level courses like Mechanics of Machines, Mechanical Vibrations and other graduate courses.							
Relationship to Student Outcomes							
SOs	1	2	3	4	5	6	7
Availability	X						
Relationship to Mechanical Engineering Program Objectives (MEPOs)							
MEPO1		MEPO2		MEPO3		MEPO4	
ABET Student Outcomes (SOs)							
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics						
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors						
3	An ability to communicate effectively with a range of audiences						
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts						
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives						
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions						
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies						
Updated by ABET Committee, 2024							