



THE HASHEMITE UNIVERSITY
FACULTY OF ENGINEERING
COURSE SYLLABUS
DEPARTMENT OF MECHANICAL ENGINEERING



COURSE TITLE - CH:	Dynamics	- 3 (3,0, 0)	COURSE NUMBER:	1104022231
DESIGNATION:	Compulsory		PREREQUISITE(S):	110401211
INSTRUCTOR:	Fairs AL-Oqla		INSTRUCTOR'S E-MAIL:	Fmaloqla@hu.edu.jo
COURSE COORDINATOR:	Fairs AL-Oqla			
OFFICE HOURS:	See posted hours			
LECTURE TIME AND LOCATION:				

Course Description (catalog):

The course addresses Position, Velocity, Acceleration, Potential and Kinetic Energy, Work, Linear Impulse, General Plane Motion, Projectile Motion, Angular Impulse, for particles and rigid bodies as well as the Mass Moment of Inertia, Parallel-Axis Theorem, Radius of Gyration for the rigid bodies. Power, Impacts, Angular Velocity, Relative Motion, Linear Momentum, Angular Acceleration, Rotating Frame, Newton's Laws, Angular Momentum and Instantaneous Center.

Textbook(s) and/or Other Supplementary Materials:

Engineering Mechanics: Dynamics by R.C. Hibbler, Pearson, Latest Edition.

Major Topics Covered:

Topics	# Weeks	# Contact hours*
12 Kinematics of a Particle	3	9
13 Kinetics of a Particle: Force and Acceleration	2	6
First Exam		1
14 Kinetics of a Particle: Work and Energy	2	6
15 Kinetics of a Particle: Impulse and Momentum	2	6
Second Exam		1
16 Planar Kinematics of a Rigid Body	2	6
17 Planar Kinetics of a Rigid Body: Force and Acceleration	2	6
Total	13	41

*Contact hours include lectures, quizzes and exams

Specific Outcomes of Instruction (Course Learning Outcomes):

After completing the course, the student will be able to:

- Solve problems of rectilinear and curvilinear motion of particles and rigid bodies. (a, e)
- Analyze the design structures and machine components using kinematics and kinetics principles of particles and rigid. (a, e)
- Apply the principles of forces and accelerations, energy and momentum for solving engineering problems. (a, e)
- Develop critical thinking process by applying analytical and sometimes computational Methods for solving problems. (a, e, k)

Student Outcomes (SO) Addressed by the Course:

#	Outcome Description	Contribution
General Engineering Student Outcomes		
(a)	an ability to apply knowledge of mathematics, science, and engineering	H
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	H
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	L
H=High, M= Medium, L=Low		

Grading Plan:1st Exam 20 points2nd Exam 20 points

Quizzes 15 points

Presentations 5 points

Final exam 40 Points

TBA

Attendance:

Attendance is subject to university laws and regulations which state a 15% (approximately 5 lectures) or less, and up to 20% allowed absence in cases of medical emergencies. Any student who exceeds these limits will not be admitted to the final exam.

Course Contents

Chapter 12: Kinematics of a Particle

- 12.1 Introduction
- 12.2 Rectilinear Kinematics: Continuous Motion
- 12.4 General Curvilinear Motion
- 12.5 Curvilinear Motion: Rectangular Components
- 12.6 Motion of a Projectile
- 12.7 Curvilinear Motion: Normal and Tangential Components
- 12.8 Curvilinear Motion: Cylindrical Components
- 12.9 Absolute Dependent Motion Analysis of Two Particles
- 12.10 Relative-Motion of Two Particles Using Translating Axes

Chapter 13: Kinetics of a Particle: Force and Acceleration

- 13.1 Newton's Second Law of Motion
- 13.2 The Equation of Motion
- 13.3 Equation of Motion for a System of Particles
- 13.4 Equations of Motion: Rectangular Coordinates
- 13.5 Equations of Motion: Normal and Tangential Coordinates
- 13.6 Equations of Motion: Cylindrical Coordinates

Chapter 14: Kinetics of a Particle: Work and Energy

- 14.1 The Work of a Force
- 14.2 Principle of Work and Energy
- 14.3 Principle of Work and Energy for a System of Particles
- 14.4 Power and Efficiency
- 14.5 Conservative Forces and Potential Energy
- 14.6 Conservation of Energy

Chapter 15: Kinetics of a Particle: Impulse and Momentum

- 15.1 Principle of Linear Impulse and Momentum
- 15.2 Principle of Linear Impulse and Momentum for a System of Particles
- 15.3 Conservation of Linear Momentum for a System of Particles
- 15.4 Impact

Chapter 16: Planar Kinematics of a Rigid Body

- 16.1 Planar Rigid-Body Motion
- 16.2 Translation
- 16.3 Rotation about a Fixed Axis
- 16.4 Absolute Motion Analysis
- 16.5 Relative-Motion Analysis: Velocity
- 16.6 Instantaneous Center of Zero Velocity
- 16.7 Relative-Motion Analysis: Acceleration

Chapter 17: Planar Kinetics of a Rigid Body: Force and Acceleration

- 17.1 Mass Moment of Inertia
- 17.2 Planar Kinetic Equations of Motion
- 17.3 Equations of Motion: Translation
- 17.4 Equations of Motion: Rotation about a Fixed Axis
- 17.5 Equations of Motion: General Plane Motion