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 Impul se, 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 Velo city, Relative Motion, Linear Momentum, Angular Acceleration, Rotating Frame, Newton's Laws, Angular Mome ntum 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 re alistic constraints such as economic, environmental, social, political, ethical, health an d 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 en gineering practice.	L
	H=High, **M**= Medium, **L**=Low	

Grading Plan:

1st Exam	20 points	
2nd 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) o r less, and up to 20% allowed absence in cases of medical emergencies. Any student who exceeds these limits w ill not be admitted to the final exam.

Course Contents

Chapter12: 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

Chapter13: 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