



COURSE **SyllabusAccording**

Course Name: Dynamics and Vibrations

Course Number: 04083131

General Course Information:

Course title	Dynamics & Vibrations
Course number	04083131
Credit hours	(3Hrs Theory, 0 practical)
Contact hours	(3Hrs in three times weekly)
Prerequisites/Co-requisites	Applied Mechanics 0408221
Academic Program	Renewable Energy Engineering
Program code	REE
Awarding institution	Isra University
Faculty	Engineering
Department	Renewable Energy Engineering
Level of course	2 nd Year
Academic year /semester	2 nd Semester 2021-2022
Awarded qualification	B. Sc.
Other department(s) involved in teaching the course	-
Language of instruction	English
Date of production/revision	29 Mar 2022

Course Coordinator:

Coordinator's Name: Dr. Ismail Hdaib
Office No.: 4210
Office Phone: 2486
Office Hours: Su. 13.00 – 14.00
Email: ismail.hdaib@iu.edu.jo

Other Instructors:

Instructor's Name:
Office No.:
Office Phone:
Office Hours:
Email:

Course Description(English/Arabic):

English	Dynamics: (3 semester hours) Lecture course. Understanding basic laws and principles of plane kinematics and kinetics of particle and rigid body.
Arabic	الديناميكا: (3 ساعات فصلية دراسية) محاضرات فصلية فهم القوانين والمبادئ الأساسية للحركة المستوية وحركة الجسيمات والجسم الصلب.

Text Book: Author(s), Title, Publisher, Edition, Year, Book website.

Engineering Mechanics – Dynamics - 14th Edition. Russell Charles Hibbeler - PEARSON Prentice Hall – New Jersey- ISBN : 13- 978-0-13-3915389

References: Author(s), Title, Publisher, Edition, Year, Book website.

Vector Mechanics for Engineers: Statics and Dynamics, 9th Edition -Ferdinand P. Beer, E. Russell Johnston, Jr., David F. Mazurek, Phillip J. Cornwell, Elliot R. Eisenberg.

Course Educational Objectives (CEOs):

1.	Construct proper free-body diagrams.
2.	Use appropriate kinematic relationships describing position, velocity, and acceleration for both linear and angular motion.
3.	Apply Newton's laws of motion.
4.	Apply work-energy principles.
5.	Apply impulse-momentum principles.

Intended Learning Outcomes (ILO's):

	Intended Learning Outcomes (ILO's)	Relationship to CEOs	Contribution to PLOs
A	Knowledge and Understanding:		
A1	Define basic kinematic quantities of rectilinear and curvilinear motion of particle such as: position, displacement, velocity and acceleration.	1, 2, 3	1, 2
A2	Describe and understand plane kinematics of rigid bodies.	2,3	1, 2
B	Intellectual skills:		
B1	Explain basic terms in kinetics of particles: Newton's second law, work and kinetic energy, impulse and momentum, gravitational and elastic potential energy.	2, 3, 4	1, 2
B2	Discuss direct and oblique central impact.	5	1, 2
C	Subject specific skills:		
C1	Explain plane kinetics of rigid bodies.	2, 3, 5	1, 2
C2	Determine moments and products of inertia of a mass.	2, 3, 4, 5	1, 2

Weekly Schedule (please chose the type of teaching)

☐ (3 hrs Face – To - Face)

☐ (2 hrs Face – To - Face + 1 hr Asynchronous) (Hybrid)

☐ (3 hrs Online)

Week	First Hour (.....)	Second Hour (.....)	Third Hour (.....)	Ach. ILOs	Ach. PLOs	Descriptors*
1	Rectilinear Kinematics: Continuous Motion,	Rectilinear Kinematics: Erratic Motion, General Curvilinear Motion,	Rectilinear Kinematics: Erratic Motion, General Curvilinear Motion,	A1	1,2	K
2	Curvilinear Motion: Rectangular Components, Motion of a Projectile,	Curvilinear Motion: Rectangular Components, Motion of a Projectile,	Curvilinear Motion: Rectangular Components, Motion of a Projectile,	A1	1,2	K
3	Curvilinear Motion: Normal and Tangential Components,	Curvilinear Motion: Normal and Tangential Components,	Curvilinear Motion: Cylindrical Components.	A1	1,2	S
4	Newton's Second Law of Motion,	The Equation of Motion, Equation of Motion for a System of Particles,	Equations of Motion: Rectangular Coordinates,	A2,B1	1,2	S
5	Equations of Motion: Normal and Tangential Coordinates,	Equations of Motion: Normal and Tangential Coordinates,	Equations of Motion: Cylindrical Coordinates.	A2,B1	1,2	S
6	The Work of a Force.	Principle of Work and Energy,	Principle of Work and Energy for a System of Particles,	B2	1,2	S
7	Power and Efficiency, Conservative Forces and Potential Energy,	Power and Efficiency, Conservative Forces and Potential Energy,	Conservation of Energy.	B2	1,2	S
8	Principle of Linear Impulse and Momentum,	Principle of Linear Impulse and Momentum for a System of Particles, Conservation of Linear Momentum for a System of Particles, Impact,	Angular Momentum, Relation Between Moment of a Force and Angular Momentum.	A2, B1, B2	1,2	S
9	Revision & Midterm Exam	Revision & Midterm Exam	Revision & Midterm Exam		1,2	C
10	Planar Rigid-Body Motion,	Planar Rigid-Body Motion,	Translation,	A2,B, B2	1,2	S
11	Translation,	Rotation about a Fixed Axis.	Rotation about a Fixed Axis.	A2,B, B2	1,2	S
12	Mass Moment of Inertia,	Mass Moment of Inertia,	Planar Kinetic Equations of Motion,	B1,C1 C2	1,2	K
13	Equations of Motion: Translation,	Equations of Motion: Translation,	Equations of Motion: Rotation about a Fixed Axis.	B1,C1 C2	1,2	K
14	Kinetic Energy, The Work of a Force,	The Work of a Couple Moment, Principle of Work and Energy,	Conservation of Energy.	B1,C1 C2	1,2	K
15	Linear and Angular Momentum,	Principle of Impulse and Momentum,	Conservation of Momentum	B1,C1 C2	1,2	K
16	Final exam	Final exam	Final Exam		1,2	C

* K: Knowledge, S: Skills, C: Competency

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- (3 hrs Face – To - Face)
- (2 hrs. Face – To - Face +1 hr Asynchronous) (Hybrid)
- (3 hrs Online)
- Course Videos
- Practice Labs
- Discussion Forums
- Quizzes
- Other Interactive online activities

Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20%**
- Midterm **30%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required equipment:

- PC / Laptop with webcam and mic
- Internet Connection
- Access to Online Compiles such as:
Access to the IU E-Learning Platform at: <https://elearn.iu.edu.jo/>

Assessment Tools implemented in the course:

Final Exam
Midterm Exam
Quizzes
Practice Labs
Discussion Forums

Program Learning Outcome (PLOs):

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the () program will demonstrate		Bloom Taxonomy Levels*
a	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	1
b	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
c	An ability to communicate effectively with a range of audiences.	3
d	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.	4
e	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.	2
f	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	2
g	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	3

*Bloom Taxonomy Levels

Level#	1	2	3	4	5	6
Level Name	Knowledge	Comprehension	Application	Analysis	Evaluation	Synthesis

Responsible Persons and their Signatures:

Course Coordinator	Dr. Ismail Hdaib	Completed Date	29/3/2022
		Signature	
Received by (Department Head)	Dr. Zakarya Al Omary	Received Date	29/3/2022
		Signature	