Philadelphia University

Faculty of Engineering & Technology

Department of Mechanical Engineering

First Semester 2023/2024

Course Information

Course Title:	**dynamics (620212)**
Prerequisite:	Statics (620211)
Credit Hours:	3 credit hours (16 weeks per semester, approximately 44 contact hours)
Textbook:	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler
References:	Dynamics-7th edition by J. Meriam and L. Kraig
Website:	http://www.philadelphia.edu.jo/academics/nmusa
Course Description:	The study of plane motion and force systems on the particle, system of particles, and rigid bodies. It will be an overview of the application of Newton's Laws to rectilinear and curvilinear motions. Work-energy principle, and impulse momentum, will also be studied.
Instructors:	**Dr. Nabil Musa** **Email**: nmusa@philadelphia.edu.jo **Office**: Engineering Building, room E61206, ext.:2343 **Office hours**: Sat, Sun, Mon Tues, 12:00-13:00 Mon
Course Coordinator:	**Dr. Nabil Musa** **Email**: nmusa@philadelphia.edu.jo **Office**: Engineering Building, room E61206, ext.:2343 Office hours: Sat, Sun, Mon Tues, 12:00-13:00 Mon
Technology Requirements:	• Personal computer, laptop, or mobile phone. • Internet Connection. • Access to Philadelphia University E-Learning Portal (MS Teams and Moodle)
Learning Style:	Blended
Communication:	• Announcement: the announcements will be posted in MS Teams or Moodle on a regular basis. • Email. • MS Teams or Moodle chats.
Course Objectives	• Introduction to dynamic, Rectilinear Kinematics, Continuous Motion General Curvilinear Motion of Particles. • Motion of projectile, normal and tangential components, absolute Dependent Motion of Two Particles • Relative motion of two Particles using Translating axes, equation of Motion: Rectangular Coordinates, Equation of

	Motion for a System of Particles, Normal and Tangential Coordinates • Work of a force, the principle of work and energy, conservative Forces, and Potential Energy • Planer kinematics of rigid bodies instantaneous center method

Course Learning Outcomes (CLO) and Relation to ABET Student Outcomes		
CLOs	**Outcomes**	**ABET PLOs**
K1,K2	Perform kinematic analysis on particles undergoing a rectilinear or curvilinear motion	1
K1,K2	Perform kinematic analysis on rigid bodies based on the relative motion principle	1
K1,K2	Perform kinetic analysis on particles using **Newton's second law of motion**, the "**work and energy**" principle, and the "**impulse and momentum**" principle	1
K1,K2	Perform kinetic analysis on rigid bodies using equations of motion	1

Grading Policy and Assessment Instruments					
Graded Item	**Marks**	**Topic (s)**	**CLO(s)**	**Learning Portal** (Teams/ Moodle/ F2F/ Others)	**Week**
Assignment 1	5	Relative motion, kinetic of particle	K1,K2	F2F	5
Assignment 2	5		K1,K2	F2F	11
Quiz 1	5	Curvilinear motion, and absolute depending motion.	K1,K2	F2F	4
Quiz 2	5	Rectangular, normal, and tangential coordinate	K1,K2	F2F	6
Quiz 3	5	Power and efficiency	K1,K2	F2F	10
Quiz 4	5	Impulse and momentum	K1,K2	F2F	12
Mid Exam	30%	Weeks 1-8	K1,K2	F2F	8
Final Exam	40%	Week 1-15	K1,K2	F2F	16
Total Marks	**100%**				
Notes:	• Two written exams will be given. • Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero marks for that homework. • Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s). • Homework: Problem sets will be given to students. Homework should be solved individually and submitted before the due date. • The final exam will cover all the class material.				

Course Content: Learning Resources/ References/ Activities/ Assessment Methods							
Week	**Lecture**	**Topic**	**CLOs**	**Learning Resources/ References/ Activities/ Assessment Method**	**Learning Style** (F2F, Synchronous, Asynchronous)	**Learning & Teaching Methods**	**Assessment Method**
1	**L1**	Rectilinear kinematics, straight-line motion	-	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board notes	-
	L2	Rectilinear kinematics, erratic motion	K1	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board notes	F2F questions
	L3	Curvilinear motion, rectangular components	K1	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle	F2F questions
2	**L1**	Motion of projectile (lecture)	K1	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board note+ PPP	F2F questions
	L2	Motion of projectile (problem-solving)	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board notes +PPP	F2F questions
	L3	Motion of projectile (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	-
3	**L1**	Curvilinear motion, normal and tangential components (lecture)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board notes + PPP	F2F questions
	L2	Curvilinear motion, normal and tangential components (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and	F2F	White board notes	F2F questions

				L. Kraig		+ PPP	
	L3	Absolute dependent motion (lecture)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	-
4	**L1**	Absolute dependent motion (problem-solving) Quiz 1	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board notes + PPP	F2F questions Quiz
	L2	Relative motion (lecture)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	White board notes + PPP	F2F questions
	L3	Relative motion (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	F2F Quiz next lecture
5	**L1**	Newton's laws of motion	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions
	L2	The equations of motion	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L3	The equations of motion: rectangular coordinates Assignment 1	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	Discussion Assignment
6	**L1**	The equations of motion: normal and tangential coordinate (lecture)	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F question
	L2	The equations of motion: normal and tangential coordinate (problem-solving)	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + quiz

		Quiz 2					
	L3	The work of the force (lecture)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	PPP + white board	Discussion in the class
7	**L1**	Principle of work and energy (lecture)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L2	Principle of work and energy (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L3	Principle of work and energy (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	-
8	**L1**	Power and efficiency (lecture)		Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	-	Written exam
	L2	Power and efficiency (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L3	Power and efficiency (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	Report writing
9	**L1**	Conservative forces and potential energy	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	-----
	L2	Conservative forces and potential energy (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions

	L3	Conservative forces and potential energy (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	--
10	**L1**	Principle of linear impulse and momentum Quiz	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + quiz
	L2	Principle of linear impulse and momentum (lecture)	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F question
	L3	Principle of linear impulse and momentum (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	Class discussion
11	**L1**	Principle of linear impulse and momentum (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions
	L2	conservation of linear impulse and momentum (lecture)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions
	L3	linear impulse and momentum (lecture) Assignment 2	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	Discussion Assignment
12	**L1**	linear impulse and momentum (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions
	L2	linear impulse and momentum (problem-solving) Quiz	K2, S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + quiz
	L3	introduction to rigid body motion		Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS	--------

						teams	
13	**L1**	Rotation body about a fixed axis	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions
	L2	Absolute motion analysis for rigid body rotation about a fixed axis	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions
	L3	Absolute motion analysis for rigid body rotation about a fixed axis (problem-solving)	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	--
14	L1	Relative motion analysis velocity of rigid body	K2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L2	Relative motion analysis velocity of a rigid body (problem-solving)	K2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L3	Instantaneous center of zero velocity	S2	Philadelphia University E-learning System (Moodle).	Asynchronous	Moodle + MS teams	Report writing
15	**L1**	Instantaneous center of zero velocity (problem-solving)	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-7th edition by J. Meriam and L. Kraig	F2F	PPP + white board	F2F questions + students presentation
	L2	Relative motion analysis and acceleration of the rigid	S2	Engineering Mechanics-Dynamics-14th edition by R. C. Hibbeler, and Dynamics-	F2F	PPP + white	F2F questions + student

		body		7th edition by J. Meriam and L. Kraig		board	s presentation
16		Final exam	K2, S2		F2F	PPP + white board	

Notes:
For Blended and F2F Courses: L1 & L2 each 1 hour.
For Online Course: L1 and L2 each 1.5 hours.

Credit Hours Distribution Report	
Learning Style	**Credit Hours**
F2F	32
Synchronous	0
Asynchronous	16
Total	48

Academic Honesty/ Student Conduct	○ As a student at Philadelphia University, you are expected to follow the university regulations and guidelines for academic honesty/student conduct found in the student handbook. ○ This means that you should not cheat, plagiarize, and let another student use your account in LMS learning portals.
Attendance Policy	Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

October 2023