Jordan University of Science and Technology

Faculty of Science & Arts

Physics Department

PHY312 Classical Mechanics (2)

Second Semester 2022-2023

Course Catalog
3 Credit Hours. Some methods in calculus of variations Hamilton?s principle ? Lagrange and Hamiltonian dynamics Motion in a noninertial reference frame Dynamics of rigid bodies Coupled oscillations

Text Book	
Title	Classical Dynamics of Particles and Systems
Author(s)	Marion and Thornton
Edition	4th Edition
Short Name	Classical Physics
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Mechanics	Mechanics	K. R. Symon	3rd Edition	
Analytical Mechanics	Analytical Mechanics	G. R. Flowers and G. L. Cassiday	5th Edition	

Instructor	
Name	**Dr. EMAD ALMAHMOUD**
Office Location	-
Office Hours	Sun : 11:30 - 12:30 Sun : 13:30 - 14:30 Mon : 09:00 - 10:00 Tue : 11:30 - 12:30 Tue : 13:30 - 14:30 Thu : 11:30 - 12:30
Email	eaalmahmoud@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 10:00 - 11:30 Room: NF39

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
923110	PHY311 Classical Mechanics (1)	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	Euler's Equation, The second form of Euler Equation	From **Classical Physics**
Week 2	Functions with several dependent variables & Euler equations when auxiliary conditions are imposed	From **Classical Physics**
Week 3	Hamilton's Principle, Generalized Coordinates	From **Classical Physics**
Week 4	Lagrang's Equations of Motions in Generalized Coordinates	From **Classical Physics**
Week 5	Lagrange's Equations with Undetermined Multipliers & Equivalence of Lagrange's and Newton's Equations	From **Classical Physics**
Week 6	A Theorem Concerning the Kinetic Energy, Conservation Theorems Revisited	From **Classical Physics**
Week 7	Canonical Equations of Motion- Hamiltonian Dynamics	From **Classical Physics**
Week 8	Rotating Coordinates System	From **Classical Physics**
Week 9	Centrifugal and Coriolis Forces, Motion relative to the Earth	From **Classical Physics**
Week 10	Inertia Tensor and Angular Momentum	From **Classical Physics**
Week 11	Principle Axes of Inertia, Moments of Inertia for Different Body Coordinates System	From **Classical Physics**
Week 12	Further Properties of the Inertia Tensor, Eulerian Angles	From **Classical Physics**
Week 13	Euler's Equations for a Rigid Body, Force Free Motion of a Symmetric Top	From **Classical Physics**

Week 14	Stability of Rigid-Body Rotations	From **Classical Physics**
Week 15	Two Coupled Harmonic Oscillators, Weak Coupling	From **Classical Physics**

Mapping of Course Outcomes to Program Student Outcomes	**Course Outcome Weight (Out of 100%)**	**Assessment method**
Describe and understand the motion of a single particle using Lagrange-Hamilton formalism. [31]	30%	
Describe and understand the motion of a system of particles using Lagrange-Hamilton formalism. [31]	30%	
Describe and understand the motion in non-inertial reference frame [31]	20%	
Understand and describe the dynamics of rigid bodies [31]	20%	

Relationship to Program Student Outcomes (Out of 100%)					
1	2	3	4	5	6
100					

Evaluation	
Assessment Tool	**Weight**
MID Exam	50%
Final Exam	50%

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