Jordan University of Science and Technology

Faculty of Science & Arts

Physics Department

PHY312 Classical Mechanics (2) - JNQF Level: 7

Second Semester 2024-2025

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
Teaching Method: On Campus

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	**Prof. Mohammed Al-Qadi**
Office Location	NA
Office Hours	Sun : 10:00 - 11:00 Sun : 12:00 - 13:00 Mon : 11:00 - 12:30 Tue : 10:00 - 11:00 Tue : 12:00 - 13:00 Thu : 10:00 - 11:00

Email	malqadi@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 09:00 - 10:00 Room: M3306

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 Outcomes and NQF Outcomes	**Course Outcome Weight (Out of 100%)**	**Assessment method**
Describe and understand the motion of a single particle using Lagrange-Hamilton formalism. [3SLO1(K1S1)] [1L7K1, 1L7S1]	30%	
Describe and understand the motion of a system of particles using Lagrange-Hamilton formalism. [3SLO1(K1S1)] [1L7K1, 1L7S1]	20%	
Describe and understand the motion in non-inertial reference frame [3SLO1(K1S1)] [1L7K1, 1L7S1]	25%	
Understand and describe the dynamics of rigid bodies [3SLO1(K1S1)] [1L7K1, 1L7S1]	25%	

Relationship to Program Student Outcomes (Out of 100%)					
SLO1(K1S1)	SLO2(S23C1)	SLO3(C24)	SLO4(C3)	SLO5(C4)	SLO6(S2C3)
100					

Relationship to NQF Outcomes (Out of 100%)	
L7K1	L7S1
50	50

Evaluation	
Assessment Tool	**Weight**
First Exam	30%
Second Exam	30%
Final Exam	40%

Policy	
student behavior	As students in a technical program are preparing for a professional career, all students are expected to conduct themselves, in both manner and dress, as professionals. Eating, drinking, or the consumption of any tobacco products is prohibited during class meetings (lecture hall, classroom, laboratory, or field). Doing so may result in the student's dismissal from that class period and will count as an unexcused absence. Cell phones, pagers, and similar devices must be turned off during the instruction time. Use of or disruption of class by these devices will result in the confiscation of the device by the instructor, and may result in the student's dismissal from that class period.

Attendance	Students are required to attend scheduled lectures and to work on class and lab/field assignments as scheduled by the professor. Students are required to attend their scheduled sections for lectures, and examinations (unless authorized by the professor). Since class sessions start on certain time, students are expected to be punctual. There will be no late entries once a class has begun. In this case, student's absence will be counted as unexcused andwill receive a zero for any assignments due. If a student must leave class early during a regularly scheduled meeting, he/she must discuss reasons with the professor. If a student must miss a scheduled class meeting due to anacceptable, verifiable time conflict, he/she must resolve the time conflict prior to class.
Honesty Policy & Discipline (Due Process)	unacceptable behavior within all University courses. Students having academic problems should consult with their advisor or a college counselor. Instances of cheating will be dealt with in accordance to University policy. Standards of academic honesty and due process procedures for JUST are located in the Rules, Regulations & Expectations section of the student.
Safety Guidelines	Certain class assignments may require the student to be absent from the professor's immediate supervision. Whether the student is under immediate supervision or not, safe conduct and safe use of equipment shall be the ultimate rule. Failure to comply with prudent safety practice and/or willful disregard for class participants and/or equipment may be cause for immediate dismissal from that particular class session by the professor.

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