مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

Course Syllabus

1	**Course title**	***Classical Mechanics 1***
2	**Course number**	0302351
3	**Credit hours**	*(3, 0)*
	Contact hours (theory, practical)	*(48, 0)*
4	**Prerequisites/corequisites**	0302281
5	**Program title**	Physics
6	**Program code**	0302
7	**Awarding institution**	University of Jordan
8	**School**	Science
9	**Department**	Physics
10	**Course level**	*Third Year*
11	**Year of study and semester(s)**	*Third , First Semester*
12	**Other department(s) involved in teaching the course**	Non
13	**Main teaching language**	English
14	**Delivery method**	☒ **Face to face learning** ☐Blended ☐Fully online
15	**Online platforms(s)**	☒ **Moodle** ☐Microsoft Teams ☐Skype☐Zoom ☐Others……
16	**Issuing/Revision Date**	10/10/2022

مركز الاعتماد وضمان الجودة

17 Course Coordinator:

Name: Ahmad S Masadeh	Contact hours: Sunday Monday 11 -12
Office number: 12	Phone number: 22065
Email: ahmad.masadeh@ju.edu.jo	

18 Other instructors:

None

19 Course Description:

Newtonian mechanics; oscillations: simple harmonic oscillator, damped oscillations, forced oscillations; gravitation; central force motion; rotating frames.

20 Course aims and outcomes:

A- Aims:

B- Students Learning Outcomes (SLOs):

For purposes of mapping the course SLOs to the physics program SLOs, at the successful completion of the physics program, graduates are expected to be able to:

SLO (1) Master professionally a broad set of knowledge concerning the fundamentals in the basic areas of physics: Classical Mechanics, Electrostatics and Magnetism, Quantum Mechanics, Thermal Physics, Optics, Theory of Special Relativity, Mathematical Physics, Electronics.

SLO (2) Apply knowledge of mathematics and fundamental concepts in the basic areas of physics to identify and solve physics related problems.

SLO (3) Utilize computers and available software in both data collections and data analysis.

SLO (4) Utilize standard laboratory equipment, modern instrumentation, and classical techniques to design and conduct experiments as well as to analyze and interpret data.

SLO (5) Develop a recognition of the need and ability to engage in life-long learning.

SLO (6) Demonstrate ability to use techniques, skills, and modern scientific tools necessary for professional practice.

SLO (7) Communicate clearly and effectively in both written and oral forms.

SLO (8) Apply proficiently team-work skills and employ team-based learning strategies.

SLO (9) Apply professional and ethical responsibility to society.

Upon successful completion of this course, students will be able to:

Program SLOs / Course SLOs	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)	SLO (9)
1. Demonstrate proficiency in mathematical concepts needed for a proper understanding of classical mechanics.	✓		✓				✓		
2. Analyze elementary motion problems involving constant acceleration motion	✓	✓			✓				
3. Understand and apply Newton's laws of motion, and Newton's law of universal gravitation, in common problems									
4. Apply conservation of total mechanical energy and linear momentums principles in common problems									
5. Solve problems dealing with force depends on position and force depends on velocity.									
6. understand and apply concepts of non- inertial frames of reference									
7. Understand the concept of central force a Derive Kepler's laws.									

21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous/ Asynchronous Lecturing	Evaluation Methods	Resource
1	1.1	Introduction Units and Dimensions						
	1.2	Vectors						
	1.3	The Scalar Product						
2	2.1	The Vector Product						
	2.2	An Example of the Cross Product: Moment of a Force. Triple Products						
	2.3	Change of Coordinate System: The Transformation Matrix						
Week	**Lecture**	**Topic**	**Intended Learning Outcome**	**Learning Methods(Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous/ Asynchronous Lecturing**	**Evaluation Methods**	**Resource**
3	3.1	Derivative of a Vector						
	3.2	Position Vector of a Particle: Velocity and Acceleration in Rectangular Coordinates						
	3.3	Velocity and Acceleration in Plane Polar Coordinates						
4	4.1	Velocity and Acceleration in Cylindrical Coordinates						
	4.2	Problems Ch1						

	4.3	Newton's Law of Motion: Historical Introduction						
5	5.1	Rectilinear Motion: Uniform Acceleration Under a Constant Force						
	5.2	Forces that Depend on Position: The Concepts of Kinetic and Potential Energy						
	5.3	Velocity-Dependent Forces: Fluid Resistance and Terminal Velocity						
6	6.1	Introduction						
	6.2	Linear Restoring Force: Harmonic Motion						
	6.3	Energy Considerations in Harmonic Motion						
7	7.1	Damped Harmonic Motion						
	7.2	Forced Harmonic Motion: Resonance						
	7.3	Problems Ch3						
8	8.1	Introduction: General Principles						
	8.2	The Potential Energy Function in Three-Dimensional Motion: The Del Operator						
	8.3	Forces of the Separable Type: Projectile Motion						

9	9.1	The Harmonic Oscillator in Two and Three Dimensions							
	9.2	Motion of Charged Particles in Electric and Magnetic Fields							
	9.3	Constrained Motion of a Particle							
10	10.1	Problems Ch4							
	10.2	Accelerated Coordinate systems and inertial Forces.							
	10.3	Accelerated Coordinate systems and inertial Forces							
11	11.1	Rotation Coordinate Systems							
	11.2	Rotation Coordinate Systems							
	11.3	Dynamics of a particle in a rotating coordinate system							
12	12.1	Dynamics of a particle in a rotating coordinate system							
	12.2	Problems Ch5							
	12.3	Introduction							
13	13.1	Gravitational Force between a Uniform Sphere and a Particle							
	13.2	Kepler's Laws of Planetary Motion							

	13.3	Kepler's Second Law: Equal Areas							
14	14.1	Kepler's First Law: The Law of Ellipses							
	14.2	Kepler's Third Law: The Harmonic Law							
	14.3	Problems Ch6							
15	15.1								
	15.2								
	15.3								

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform

23 Course Requirements

White board and overhead projector.

24 Course Policies:

A- Attendance policies:

Regular attendance according to the rules of the host institution

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

Based on the rules of the host institution.

C- Health and safety procedures:

Based on the rules of the host institution

D- Honesty policy regarding cheating, plagiarism, misbehavior:

According the rules of the host institution

E- Grading policy:

Grading the exam based on a key solution.

F- Available university services that support achievement in the course:

e-learning.

25 References:

A- Required book (s), assigned reading and audio-visuals:

Analytical Mechanics" by Grant R. Fowles and George L. Cassiday, 7th Edition, 2005, Thomson/Brooks-cole

B- Recommended books, materials, and media:

Marion, J. B., and Thornton, S. T., Classical Dynamics, 5th ed., Brooks/Cole-Thomson Learning, Belmont, CA, 2004.

26 Additional information:

A set of problems for each topic will be assigned as homework. Solutions of these and other Problems will be discussed in class.

Name of Course Coordinator: -: Ahmad Masadeh Signature: *Ahmad Masadeh* Date: -10-10-2022
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------