Course Specification

(Postgraduate Programs)

Course Title:	Classical Physics
Course Code:	PHYS601
Program:	Master of Science in Physics
Department:	Physical Sciences
College:	Science
Institution:	Jazan University
Version:	
Last Revision Date:	20/4/2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3)				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 1 / year 1)				
4. Course general Description:				
This course covers the Lagrange mechanics: variation principle, Lagrange's equation, conservation laws; Central force field: Kepler's laws, virial theorem, scattering; Rotation of rigid bodies: orthogonal transformation, Euler's equation, Euler's angles, moment of inertia; Oscillation: formulation, forced oscillation, damped oscillation, parametric oscillation; Hamilton theory: Hamilton's equation of motion, Legendre transformation, canonical transformation, Hamilton'-Jacobi equation.				
5. Pre-requirements for this course (if any): Non				
6. Co-requirements for this course (if any): Non				
7. Course Main Objective(s):				

The main objectives of this course are focused on the following:

- **Apply the basic foundation for courses such as quantum mechanics and electrodynamics.**
- **Use the Lagrange and Hamilton formulations that are required to study the dynamics of physical systems.**
- **Reformulate the Newton's laws of motion as variational principle, using Lagrange's equation for deriving equation of motions for system of particles.**
- **Apply the conservation laws to study system such as rigid bodies.**
- **Carry out analysis associated with vibrations of multi-degree of freedom and continuous systems, and transition from classical mechanics to quantum mechanics.**

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding: Upon completing the course students will be able to**			
1.1	**Describe** some essential processes such as scattering, variation principle, virial theorem, rotation of rigid bodies in terms of Euler's angle	PLO1.1	Lectures, discussion	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	**Discuss** basics ideas such as conservation laws, motion in central field, various oscillations	PLO1.2	Lectures, discussion	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey
…				
2.0	**Skills: Upon completing the course students will be able to**			
2.1	**Obtain** basic laws or equations such as Lagrange's equation, Kepler's laws, Hamilton's equations, Hamilton-Jacobi equation	PLO2.1	Lectures, discussion	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey
2.2	**Apply** Lagrange's and Hamilton's equations to find the equation of motion of various systems such as simple harmonic oscillator, pendulum, Atwood machine.	PLO2.1	Lectures, discussion, Tutorial	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey
2.3	**Solve** some basic problem of interest such as calculating the moment of inertia, eigen-frequencies, period of planets, various transformed variables	PLO2.1	Lectures, discussion, Tutorial	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect:** student survey

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility: Upon completing the course students will be able to**			
3.1	**Apply** practices of life-long learning in various physics topics and scientific disciplines	PLO3.2	Expository and Discovery, and Interactive Discussions.	Group assignments, discussion
3.2	**Demonstrate** abilities of team work, bear individual responsibilities on assigned tasks.	PLO3.3	Expository and Discovery, and Interactive Discussions.	Group assignments, discussion
...				

C. Course Content:

No	List of Topics	Contact Hours
1.	Short review of classical physics	5
	Lagrange Mechanics	8
3	Central force field	8
4	Rotation of rigid bodies	8
5	Oscillations	8
6	Hamilton's mechanics	8
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	**First mid-term exam**	**6**	**15**
2	**Activities (home-works, tests, class activities)**	**Over the semester**	**20**
3	**Second mid-term exam**	**12**	**15**
4	**Final Exam**	**16**	**50**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	H. Goldstein, Charles P. Poole &John Safko, Classical Mechanics (Pearson Education, 2011)).

Supportive References	1. L D Landau and E. M. Lifshitz, Mechanics (Course of Theoretical Physics-Volume1), third edition, (Butterworth-Heinemann, 1976). 2. John R. Taylor, Classical Mechanics (University Science Books, 2005). 3. S.T.Thornton and J.B.Marion, Classical Dynamics of Particles and Systems, fifth edition (Cengage Learning, 2003).
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Class room
Technology equipment (Projector, smart board, software)	Data show- smart boar
Other equipment (Depending on the nature of the specialty)	None

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (CES)- Indirect peer evaluation
Effectiveness of student's assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department Council**
REFERENCE NO.	**Psci2415**
DATE	**1/10/2024**