2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Classical Mechanics -٢**
Course Code:	**PHYS26222**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**University of Bisha**
Version:	**3**
Last Revision Date:	**25 July 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:	3

2. Course type					
A.	University ☐	College ☐	Department☒	Track☐	Others☐
B.	Required ☒	Elective☐			

3. Level/year at which this course is offered:	4th Level / 2nd year
4. Course general Description	
Classical mechanics -2 Completion of the study of classical mechanics topics, including the subjects of the angular momentum, the static equilibrium and elasticity, gravitation, the fluid mechanics, and the Lagrangian and Hamiltonian formalism.	
5. Pre-requirements for this course:	
PHYS26221 Classical Mechanics -1	
6. Co- requirements for this course:	
NA	
7. Course Main Objective(s)	
Recognize the principles of advanced classical mechanics.	

2. Teaching mode

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	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			
1.1	Define the Angular Momentum.	K.1	Lectures Solve problems	Written test Reports Homework Quizzes
1.2	Describe the equilibrium state and the universal gravitation.	K.1		
1.3	Identify the characteristics of fluids.	K.1		
1.4	Recognize the Lagrangian and Hamiltonian Formalism.	K.1		
2.0	Skills			
2.1	Apply the Angular Momentum.	S.1	Lectures Solve problems.	Written test Reports Homework Quizzes
2.2	Analyze the equilibrium state and the universal gravitation.	S.1		
2.3	Solve problems related to the motion of fluids.	S.1		
2.4	Solve problems related to the Lagrangian and Hamiltonian Formalism.	S.1		
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently.	V.2	Self-learning	Reports Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	**Angular Momentum** 1. The Vector Product and Torque. 2. Non-isolated System (Angular Momentum).	4.5

	3. Angular Momentum of a Rotating Rigid Object. 4. Isolated System (Angular Momentum)	
2.	**Static Equilibrium** 1. Rigid Object in Equilibrium. 2. More on the Center of Gravity. 3. Examples of Rigid Objects in Static Equilibrium	4.5
3.	**Universal Gravitation** 1. Newton's Law of Universal Gravitation 2. Free-Fall Acceleration and the Gravitational Force	4.5
4.	**Fluid Mechanics** 1. Pressure 2. Variation of Pressure with Depth 3. Pressure Measurements 4. Buoyant Forces and Archimedes' Principle	4.5
5.	**Fluid Mechanics** 5. Fluid Dynamics 6. Bernoulli's Equation 7. Flow of Viscous Fluids in Pipes	4.5
6.	**Lagrangian mechanics** 1. Hamilton's Variational Principle	4.5
7.	**Lagrangian mechanics** 2. Generalized Coordinates	4.5
8.	**Lagrangian mechanics** 3. Calculating Kinetic and Potential Energies in Terms of Generalized Coordinates 4. Lagrange's Equations of Motion for Conservative Systems	4.5
9.	**Lagrangian mechanics** 5. Some Applications of Lagrange's Equations -The Harmonic Oscillator -Single Particle in a Central Force Field 6. Generalized Momenta -Pendulum Attached to a Movable Support	4.5
10.	**Lagrangian mechanics** 7. The Hamiltonian Function	4.5
Total		45

Table: The matrix of consistency between the content and the learning outcomes of the course.

	Course Learning Outcomes								
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1
Topic 1	√				√				√
Topic 2		√				√			√
Topic 3		√				√			√
Topic 4			√				√		√
Topic 5			√				√		√
Topic 6				√				√	√
Topic 7				√				√	√
Topic 8				√				√	√
Topic 9				√				√	√
Topic 10				√				√	√

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %
4.	Final exam	End of Semester	50 %

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Physics for Scientists and Engineers, 10th Edition, by Raymond A. Serway, John W. Jewett, BROOKS/COLE CENGAGE Learning, Boston USA,ASIN : B00E6TSR92, (2019).
Supportive References	Fundamentals of Physics Extended, 12th Edition, David Halliday, Robert Resnick, Jearl Walker, Wiley, 2021.
Electronic Materials	- Blackboard. - PowerPoint presentations.

	- Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities	Classrooms, Physics lab.
Technology equipment	Data show or smart board.
Other equipment	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Extent of achievement of course learning outcomes.	Teachers, students.	Direct (Final exams), Indirect (Questionnaire).
Effectiveness of teaching.	Teachers, students.	Indirect (Questionnaire)
Effectiveness of assessment.	Teachers, students.	Indirect (Questionnaire)
Quality of learning resources	Teachers, students.	Indirect (Questionnaire)
Quality of facilities available	Teachers, students.	Indirect (Questionnaire)
Fairness of evaluation	Peer reviewer.	Direct (Final exams reevaluation).

G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	20
DATE	**17 August 2023**