هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	**Quantum Mechanics-1**
Course Code:	**PHYS26363**
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:	6th Level / 3rd year

4. Course general Description
This course deals primarily with the wave function and the Schrödinger equation. The course covers the postulates of quantum mechanics, Particle in one- dimensional box with walls of infinite height, Harmonic oscillator, particle in a three-dimensional box, and Schrödinger's equation for the Hydrogen atom.
5. Pre-requirements for this course:
PHYS26361 Modern Physics
6. Co- requirements for this course:
NA
7. Course Main Objective(s)
Recognize the fundamentals of quantum mechanics.

2. Teaching mode (mark all that apply)

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 wave function.	K.2	Lectures Solve problems	Written test Reports Homework Quizzes
1.2	Recognize commutation relations in quantum mechanics.	K.2		
1.3	Describe the time-independent Schrödinger equation.	K.2		
1.4	Identify the quantum mechanics in three dimensions.	K.2		
2.0	Skills			
2.1	Solve problems in the wave function.	S.1	Lectures Solve problems.	Written test Reports Homework Quizzes
2.2	Solve problems in the commutation relations in quantum mechanics.	S.1		
2.3	Apply the time-independent Schrödinger equation.	S.1		
2.4	Analyze Schrödinger equation in three dimensions.	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.	**The Wave Function** 1. The Schrödinger Equation **2.** The Statistical Interpretation	4.5
2.	3. Probability 4. Normalization	4.5
3.	5. Momentum 6. The Uncertainty Principle	4.5
4.	**Formalism** 1. Linear algebra	4.5
5.	2. Function spaces 3. The generalized statistical interpretation.	4.5
6.	**The Time-Independent Schrödinger Equation** 1. Stationary States 2. The Free Particle	4.5
7.	3. The Infinite Square Well 4. The Delta-Function Potential	4.5
8.	5. The Finite Square Well 6. The Scattering Matrix	4.5
9.	**Quantum Mechanics in Three Dimensions** 1. Schrödinger Equations in spherical coordinates. 2. The Harmonic Oscillator	4.5
10.	3. The Hydrogen Atom 4. Angular Momentum and Spin	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	- Introduction to quantum mechanics, 4rd edition, David J. Griffiths, Upper Saddle River, New Jersey, (2011).
Supportive References	- Advanced Quantum Theory, S.L Fields, Gupta,1st edition, (1982). - Understanding Quantum Mechanics, Omnès, Roland. Princeton University Press (1999).
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)

Assessment Areas/Issues	Assessor	Assessment Methods
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**