هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Quantum Mechanics**
Course Code:	**MPHY6343**
Program:	**Medical Physics**
Department:	**Physics**
College:	**Science**
Institution:	**University of Bisha**
Version:	**1**
Last Revision Date:	**5 September 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:	3h

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 (if any):					
Modern Physics MPHY6241					
6. Co- requirements for this course (if any):					
NA					
7. Course Main Objective(s)					
Recognize the fundamental of Quantum mechanics.					

1. 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		

2. 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	Recognize the wave function.	K.2	Lecturing	Quizzes Homework Midterm exam Final exam
1.2	Recognize commutation relations in quantum mechanics.	K.2	Lecturing	Quizzes Homework Midterm exam Final exam
1.3	Recognize the time-independent Schrödinger equation.	K.2	Lecturing	Quizzes Homework Midterm exam Final exam
1.4	Recognize the quantum mechanics in three dimensions.	K.2	Lecturing	Quizzes Homework Midterm exam Final exam
2.0	Skills			
2.1	Solve problems in the quantum mechanics.	S.1	Lectures Solve problems.	Written test Reports Homework Quizzes
2.2	Communicate positively with others.	S.3	Presentation Work group	Reports Presentation
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently in the field of specialization.	V.2	Self-learning	Reports Presentation
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C. Course Content

No	List of Topics	Contact Hours
1.	The Wave Function 1. The Schrödinger Equation	12

	2. The Statistical Interpretation	
2.	The Wave Function 3. Probability 4. Normalization	
3.	The Wave Function 5. Momentum 6. The Uncertainty Principle	
4.	Formalism 1. Linear algebra 2. Function spaces	11
5.	Formalism 3. The generalized statistical interpretation.	
6.	The Time-Independent Schrödinger Equation 1. Stationary States 2. The Free Particle	12
7.	The Time-Independent Schrödinger Equation 3. The Infinite Square Well 4. The Delta-Function Potential	
8.	The Time-Independent Schrödinger Equation 5. The Finite Square Well 6. The Scattering Matrix	
9.	Quantum Mechanics in Three Dimensions 1. Schrödinger Equations in spherical coordinates. 2. The Harmonic Oscillator 3. The Hydrogen Atom	10
10.	Quantum Mechanics in Three Dimensions 4. Angular Momentum 5. Spin	
Total		

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	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 %

*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	Introduction to quantum mechanics, 3rd edition, David J. Griffiths, Upper Saddle River, New Jersey, (1999).
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	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	NA
Technology equipment (projector, smart board, software)	Projector or smart board

Items	Resources
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students.	Indirect (Questionnaire).
Effectiveness of students assessment	Students, Staff members, Program Leader.	Indirect (Questionnaire).
	Peer Reviewer.	Direct (Review exam)
Quality of learning resources	Students, Staff members, Program Leaders.	Indirect (Questionnaire).
The extent to which CLOs have been achieved	Students, Staff members, Program Leader.	Indirect (Questionnaire).
	Course coordinator.	Direct (Course Learning Outcomes Assessment).

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	١
DATE	5 September 2023