

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Quantum Mechanics(1)
Course number	PHYS3317
Faculty	
Department	
Course type	College Needs
Course level	3
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

1 - Schrödinger equations with solutions in simple potentials, including harmonic oscillator, spherically symmetric potentials with hydrogen-like atoms
---

Intended Learning Outcomes

Knowledge and Understanding	* apply principles of quantum mechanical to calculate observables on known wave functions. Solve time-dependent and time-independent Schrödinger equation for simple potentials.
-----------------------------	--

Course Contents

1 - Concept of classical mechanics, properties of the 1D potential function
2 - Experiments and theory: Work of Planck, Einstein, Bohr, De Broglie, Heisenberg and Born
3 - Postulates of quantum mechanics, Operators, wave function, operator, eigenfunctions and eigen values
4 - Function space, Dirac notation, Hermitian operators and their properties
5 - Commutation , conservation of linear momentum, conservation of energy and parity
6 - 1D Schrödinger equation, general properties and derivations
7 - Free particle in 1D box
8 - Harmonic Oscillator Problem, eigenfunctions and eigenvalues of harmonic oscillators
9 - Problems of potential barrier, Tunneling
10 - Problems of potential well, bound and unbound states
11 - Operators, angular momentum (eigenfunction and eigenvalues), addition of angular momentums
12 - Problems in 3D of Schrödinger equation, Particle in spherical coordinates, Two particle problem
13 - The Hydrogen atom

Teaching and Learning Methods

1 - The courses is given as lecture and discussion, where several problems on the material are solved at the end of each unit. In addition same assignments are given to the students as homework.
--

## Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
Homeworks	one week	10%
Two mid exams	2 hours	40%
Final exam	2 hours	50%

## Books and References

Essential books	, 2nd editionIntroduction to Quantum Mechanics, David Griffiths,
Recommended books	Concept of Quantum Mechanics, Nouredin Zettili
	csQuantum Physics, Stephan Gaziorowi