مختصر توصيف المقرر

معلومات المقرر * :(Course Information)

اسم المقرر:	ميكانيكا الكم 1
رقم المقرر:	فيز 3522
اسم ورقم المتطلب السابق:	فيز 2512 + فيز 2062
اسم ورقم المتطلب المرافق:	--
مستوى المقرر:	الخامس
الساعات المعتمدة:	3 (3+0+0)

Module Title:	Quantum Mechanics 1
Module ID:	PHYS 3522
Prerequisite:	PHYS 2512 + PHYS 2062
Co-requisite:	--
Course Level:	Fifth
Credit Hours:	3 (3+0+0)

وصف المقرر : **Module Description**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations. Hermitian operators, Linear operators, Completeness relation and orthonormality. Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta-function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigenvalues, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

أهداف المقرر : **Module Aims**

1	Demonstrate and understand how quantum states are described by wave functions	1
2	Solve the Schrödinger equation and describe the properties of a particle in simple potential wells.	2
3	Solve one-dimensional problems involving transmission, reflection and tunneling of quantum probability amplitudes;	3

4	Demonstrate an understanding of the significance of operators and eigenvalue problems in quantum mechanics.	4
5	Demonstrate an understanding of angular momentum in quantum mechanics and understanding of how quantum mechanics can be used to describe the hydrogen and helium atoms.	5

Learning Outcomes: **مخرجات التعليم:**

1	Recall the law of classical mechanics	1
2	Review of the fundamental experiments in modern physics	2
3	Describe Schrödinger equation in three dimensions, the fundamental postulates of Quantum Mechanics	3
4	Recall harmonic oscillator in classical mechanics and introduce harmonic oscillator in Quantum Mechanics.	4

Course Contents: **محتوى المقرر:**

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
3	1	Basic Elements of Quantum Mechanics
3	1	Postulates of quantum Mechanics
3	1	Infinite square well potential
3	1	Hilbert space bra, ket notion and operators and Commutators and compatibility
3	1	Finite wells, potential steps and barriers
6	2	The harmonic oscillator potential
6	2	Orbital angular momentum
6	2	Particle in a central potential
6	2	Hydrogen Atom
6	2	Electron spin, identity and Pauli Exclusion Principle

Textbook and References: **الكتاب المقرر والمراجع المساندة:**

سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
1977	Hermann	Claude Cohen-Tannoudji, Bernard. Diu B., Laloe F	Quantum Mechanics, Volume1
سنة النشر Publishing Year	**اسم الناشر Publisher**	**اسم المؤلف (رئيسي) Author's Name**	**اسم المرجع Reference**

0131118927	Pearson Prentice Hall	David J. Griffiths	Introduction to Quantum Mechanics
0471057002	Wiley	Stephen Gasiorowicz	Quantum Physics
0470026790	Wiley	Nouredine Zettili	Quantum Mechanics: Concepts and Applications