معلومات المقرر *		(Course Information):
اسم المقرر:		ميكانيكا الكم 2
رقم المقرر:		فيز 4532
اسم ورقم المتطلب السابق:		فيز 3522
اسم ورقم المتطلب المرافق:		--
مستوى المقرر:		السابع
الساعات المعتمدة:		3 (3+0+0)

Module Title:	Quantum Mechanics II
Module ID:	PHYS 4532
Prerequisite:	PHYS 3522
Co-requisite:	--
Course Level:	Seventh
Credit Hours:	3 (3+0+0)

Module Description

وصف المقرر :

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigenstates of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time-independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

Module Aims

أهداف المقرر :

1	Demonstrate an understanding of 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 tunnel effect of quantum probability and demonstrate an understanding of the significance of operators and eigenvalue problems in quantum mechanics;	3
4	Demonstrate an understanding of how quantum mechanics can be used to describe the hydrogen and helium atoms.	4
5	Study and use Variational principle and its applications, The WKB approximation Use perturbation theory (time independent or time dependent to resolve approximately Schrödinger equation: Stark effect, Hyper fined splitting.	5

Learning Outcomes: مخرجات التعليم:

1	Recall the laws of Quantum Mechanics I	1
2	Remember Quantum Mechanics postulates	2
3	Describe orbital angular momentum and intrinsic angular momentum.	3
4	Remember expectation value and apply variational method	4
5	Use the Hilbert space, linear operator, hermitic operator to understanding quantum physics phenomena and applied the gained mathematical and experimental knowledge in any physical related topic.	5

Course Contents: محتوى المقرر:

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
3	1	Dirac notation, Vector space algebra and Hilbert space Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum,
3	1	Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics,
3	1	General relations in matrix mechanics, Eigenstates of spin $1/2$, The intrinsic magnetic moment of spin $1/2$ particles, Addition of two spins, Addition of Spin $1/2$ and orbital angular momentum.
6	2	General relations in matrix mechanics, Eigenstates of spin $1/2$, The intrinsic magnetic moment of spin $1/2$ particles, Addition of two spins, Addition of Spin $1/2$ and orbital angular momentum.
6	2	Time independent perturbation theory
6	2	Time dependent perturbation theory
3	1	Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory,
3	1	The interaction of charged particle with electromagnetic field.
6	2	Two level-system emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory. Partial wave analysis, The Born approximation.
3	1	Dirac notation, Vector space algebra and Hilbert space Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum,

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, Volume 2
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