

## Planning and Quality Assurance Affairs

Form (A)

### Course Specifications

#### General Information

Course name	Quantum Mechanics(2)
Course number	PHYS4330
Faculty	
Department	
Course type	College Needs
Course level	4
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

#### Course Objectives

1 - matrix representation of quantum mechanics
2 - spin and angular momentum representations and addition rules and identical particles treatment
3 - approximate methods (variation method, perturbation theory,

#### Intended Learning Outcomes

Knowledge and Understanding	<ul style="list-style-type: none"><li>* Combine spins and angular momenta.</li><li>* Transformation from coupled to uncoupled states</li><li>* Spin Orbit interaction and the spectroscopic notation of the atom</li><li>* To build symmetric and antisymmetric wavefunction</li><li>* Electron configuration</li><li>* Apply time-independent perturbation theory (first order) to solve simple problems.</li></ul>
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## Course Contents

- 1 - matrix representation of quantum mechanics
- 2 - Angular Momentum and spin angular momentum
- 3 - spinors and interaction of spin with the magnetic field
- 4 - Addition of Angular Momentum
- 5 - Total angular Momentum of the atom
- 6 - spin orbit interaction, coupled and uncoupled states
- 7 - The exclusion principle and angular momenta states
- 8 - Term and spectroscopic notation
- 9 - Identical particles, interacting and non-interacting
- 10 - Fermions and Bosons
- 11 - Pauli Exclusion Principle
- 12 - Electron configuration, helium atom
- 13 - Many electron atoms, Molecules, solids
- 14 - Time independent Perturbation theory
- 15 - Non-degenerate perturbation theory
- 16 - Zeeman Effect and Hyper fine Structure

## Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
Homeworks	one week1	10%
Two mid exams	2 hours	40%
Final exam	2 hours	50%

## Books and References

Essential books	Introduction to quantum Mechanics, Griffiths, 2nd edition
Recommended books	Concept of Quantum Mechanics, Nouredin Zettili