

2019-2020 SPRING SEMESTER QUANTUM MECHANICS-1 WEEKLY COURSE PLAN

WEEK	DATES	TOPICS	EXPLANATIONS
1	03 -07 February		First Meeting
2	10-14 February	CHAPTER-1 Brief Summary of Elementary Solution to Schrödinger's Wave Equation 1.1) Free Particles 1.2) Constant Potentials in One Dimension 1.3) The Central Force Problem 1.4) Hydrogen Atom	
3	17 -21 February	CHAPTER-2 Fundemantal Concepts 2.1) Introduction to Linear Algebra 2.2) Kets, Bras, and Operators 2.3) Base Kets and Matrix Representations 2.4) Spin $\frac{1}{2}$ Systems	
4	24 -28 February	2.5) Measurements, Observables and Uncertainty Relations 2.6) Position, Momentum and Translation 2.7) Wave Functions in Position and Momentum Space	
5	02-06 March	CHAPTER-3 Quantum Dynamics 3.1) Time Evolution and Schrödinger Equation 3.2) The Schrödinger Versus the Heisenberg Picture	
6	09-13 March	3.3) Simple Harmonic Oscillator 3.4) Schrödinger Wave's Equation	
7	16-20 March	3.5) Propagators and Feynman Path Integral 3.6) Potentials and Gauge Transformations	
8	23-27 March	CHAPTER-4 Theory of Angular Momentum 4.1) Angular Momentum Commutation Relations 4.2) Spin $\frac{1}{2}$ Systems and Finite Rotations	
9	30 March-3 April	Midterm	

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10	6-10 April	4.3) Eigenvalues and Eigenstates of Angular Momentum 4.4) Orbital Angular Momentum 4.5) Addition of Angular Momenta	
11	13-17 April	CHAPTER-5 Symmetry in Quantum Mechanics 5.1) Conservation Laws and Degeneracies 5.2) Discrete Symmetries and Parity	
12	20-24 April	CHAPTER-6 Approximation Methods 6.1) Time Independent Perturbation Theory: Nondegenerate Case 6.2) Time Independent Perturbation Theory: The Degenerate Case	
13	27 April-1 May	6.3) Finite Structure and the Zeeman Effect 6.4) Variational Methods 6.5) Time Dependent Potentials	
14	4-8 May	CHAPTER-7 Identical Particles 7.1) Permutation Symmetry, Two-Electron System 7.2) The Helium Atom	
15		Final Exam	

Textbooks:

- 1) Modern Quantum Mechanics, J.J. Sakurai
- 2) Introduction to Quantum Mechanics, David J. Griffiths

Course Grading System:

Midterm (40%), Homework and Quiz (20%) and Final Exam (40%)