PHYS3701 Introduction to Quantum Mechanics I (Spring 2021)

Class Schedule as of April 19, 2021

Textbook: *A Modern Approach to Quantum Mechanics, 2e* (University Science Books 2012) by John Townsend
Reading material for class noted as "Chapter.Section(s)"

Day	Date	Topics	Reading	HW Due
Tue	19 Jan	The Stern-Gerlach Experiment; Quantum States and Dirac Notation	1.1,2,3	—
Thu	21 Jan	The Postulates of Quantum Mechanics and Two-State Systems	1.4,5,6	#1
Tue	26 Jan	**Quiz #1**; Rotations and Operators	2.1,2,3	—
Thu	28 Jan	Representations, Operators, and Matrices	2.4,5,6,8	#2
Tue	2 Feb	**Quiz #2**; Rotations and Angular Momentum; Commutation	3.1,2	—
Thu	4 Feb	Eigenvalues and Eigenstates of Angular Momentum; Uncertainty relations	3.3,4,5	#3
Tue	9 Feb	**Quiz #3**; The Spin-1/2 Eigenvalue Problem	3.6	—
Thu	11 Feb	A System of Two Spin-1/2 Particles; Hyperfine Splitting in Hydrogen	5.1,2,3	#4
Tue	16 Feb	**Quiz #4**; The Hamiltonian Operator and Time Evolution	4.1,2	—
Thu	18 Feb	Spin Precession and *g*-factors; Magnetic Resonance	4.3,4,5	#5
Tue	23 Feb	**No Class (Wellness Day)**	—	—
Thu	25 Feb	Position Eigenstates and Momentum; Schödinger's Equation in One Dimension	Chapter Six	#6
Tue	2 Mar	**Quiz #5**; Solving the Harmonic Oscillator with Operator Methods	7.1,2,3	—
Thu	4 Mar	Wave Functions of the Harmonic Oscillator; Time Evolution and Coherent States	7.4-10	#7
Tue	9 Mar	**Quiz #6**; Wave Mechanics in Three Dimensions; Invariance and Conservation Laws	9.1,2,3,4,5	—
Thu	11 Mar	Orbital Angular Momentum; Spherical Harmonics	9.6,8,9	#8
Tue	16 Mar	**Quiz #7**; Central Potentials; The Free Particle and the Spherical Well	10.1,4	—
Thu	18 Mar	The One-Electron Atom	10.2	#9
Tue	23 Mar	**Quiz #8**; The Three Dimensional Isotropic Harmonic Oscillator	10.5	—
Thu	25 Mar	Time-Independent Non-Degenerate Perturbation Theory: Formalism	11.1	#10
Tue	30 Mar	**Quiz #9**; Simple Examples of Non-Degenerate Perturbation Theory	11.1	—
Thu	1 Apr	Degenerate Perturbation Theory; The Linear Stark Effect in Hydrogen	11.2,3	#11
Tue	6 Apr	**Quiz #10**; The Relativistic Correction to the Kinetic Energy in Hydrogen	11.5	—
Thu	8 Apr	The Spin-Orbit Interaction and the Energy Levels of the Hydrogen Atom	11.5,6	#12
Tue	13 Apr	**Quiz #11**; The Zeeman Effect in Hydrogen	11.7	—
Thu	15 Apr	The Variational Principle: Simple Examples; The Helium Atom	12.2	#13
Tue	20 Apr	**Quiz #12**; Scattering in Quantum Mechanics; The Differential Cross Section	6.10; 13.1	—
Thu	22 Apr	The Born Approximation; Applications	13.2,3	#14