

PHYS3701 Introduction to Quantum Mechanics I (Spring 2024)

Class Schedule as of March 27, 2024

The “Chapter.Sec1,Sec2” references are to the books by Townsend, and by Sakurai and Napolitano. Material on quantum information (Weeks 9&10) will follow sections in the textbook by Benenti, et al. [Classes held on dates/days in blue will be taught over Zoom.](#)

Week	Day	Date	Topics	MIQM2e	MQM3e	Due
1	Tue	16 Jan	The Stern-Gerlach Experiment; State Vectors and Probability Amplitudes	1.1,2	1.1	—
	Thu	18 Jan	Building simple state vectors; Operators and eigenvalues	1.3,4,5,6	1.2,3,4	—
2	Tue	23 Jan	Hermitian Operators: Eigenvalues, Completeness, and Superposition	2.1,3,6	1.4	HW 1
	Thu	25 Jan	Matrix Representation of Operators and Vectors ; Unitary Operators	2.4,5	1.3,5	—
3	Tue	30 Jan	Time Evolution and the Hamiltonian; Schrödinger’s Equation	4.1,2	2.1	HW 2
	Thu	1 Feb	Example: Precession of a Spin-1/2 Particle	4.3,4	2.1	Quiz 1
4	Tue	6 Feb	The Position Basis in 1D: Translation and Momentum Operators	6.1,2,3,4	1.7	HW 3
	Thu	8 Feb	The Schrödinger Wave Equation; The Free Particle Wave Function	6.6	2.4,5	Quiz 2
5	Tue	13 Feb	Examples: The Infinite Potential Well and Scattering from the Finite Well	6.9,10	B.2; B.3	HW 4
	Thu	15 Feb	Example: The Finite Potential Well	6.8	B.2	Quiz 3
6	Tue	20 Feb	The 1D Simple Harmonic Oscillator: Algebraic Solution	7.2-7	2.3	HW 5
	Thu	22 Feb	The 1D Simple Harmonic Oscillator: Wave Mechanical Solution	7.9	2.5.2	Quiz 4
7	Tue	27 Feb	Non-commuting Observables; Rotations and Angular Momentum	3.1,2	1.4; 3.1	HW 6
	Thu	29 Feb	The Eigenstates of the Commuting Angular Momentum Operators	3.3,6	3.5	Quiz 5
4-8 Mar Spring Break (No Classes)						
8	Tue	12 Mar	A System of Two Spin-1/2 Particles; Angular Momentum Addition	5.1,2,3	3.8.1	HW 7
	Thu	14 Mar	The Einstein-Podolsky-Rosen Paradox and the 2022 Nobel Prize	5.4,5,6	3.10	Quiz 6
9	Tue	19 Mar	Introduction; Qubits and their representation (PQCI 3.1,2)	—	—	HW 8
	Thu	21 Mar	Quantum Gates (PQCI 3.3,4,5,6)	—	—	Quiz 7
10	Tue	26 Mar	Grover’s Quantum Search Algorithm: $N = 4$ (PQCI 4.2)	—	—	HW 9
	Thu	28 Mar	Grover’s Algorithm for large N (PQCI 4.2)	—	—	Quiz 8
11	Tue	2 Apr	Wave Mechanics in Three Dimensions ; Conservation of Momentum	9.1,2,3	1.7	HW 10
	Thu	4 Apr	Estimating Ground State Energies ; Conservation of Angular Momentum	9.4,5,6	3.6	—
12	Tue	9 Apr	Orbital Angular Momentum in Position Space	9.6,8,9	3.6	HW 11
	Thu	11 Apr	Orbital Angular Momentum Eigenfunctions	9.9	3.6	Quiz 9
13	Tue	16 Apr	Spherically Symmetric (“Central”) Potentials; The Spherical Box	10.1,4	3.7.1,2	HW 12
	Thu	18 Apr	The Isotropic Three-Dimensional Harmonic Oscillator	10.5	3.7.3	Quiz 10
14	Tue	23 Apr	The One-Electron Atom: Energy Eigenvalues	10.2	3.7.4	HW 13
	Thu	25 Apr	The One-Electron Atom: Energy Eigenfunctions	10.2	3.7.4	Quiz 11