PHY 3103: Quantum Mechanics I
Academic Session: 2021-2022

3 Hours/week, 3 Credits	Examination Duration: 3 Hours

1. **Physical Basis of Quantum Mechanics:** Shortcomings of Classical Theory; The Two-slit Experiment; Wave Aspects of Matter; Wave Function and its Interpretation; Wave Packets and Uncertainty Principle.

2. **Formalism of Quantum Mechanics:** Postulates of Quantum Mechanics; The Correspondence Principle; The Complementarity Principle, Measurements and Observable; Commutation of Observations; Linear Operators; Hermitian Operators; Eigenvalue Equations; Eigenvalues and Eigenfunctions; Eigenstates; Orthonormality of Eigenstates; Degeneracy; Principle of Superposition; Probability Amplitudes Overlap Integrals; Completeness; Change of Basis; Wave Function in Position and Momentum Space.

3. **Problems in One Dimension:** The Schrödinger Wave Equation; Particle in a Potential Box; Potential Step; Tunneling through a Potential Barrier; Rectangular Potential Well; Linear Harmonic Oscillators.

4. **Spherically Symmetric Systems:** Three-dimensional Schrödinger Equation for Spherically Symmetric Potentials; Spherical Harmonics; Three Dimensional Potential Wells-degenerate States.

5. **Quantum Mechanical Theory of Hydrogen Atom:** Schrödinger Equation for the Hydrogen Atom; Electron Probability Density; Spectrum of Hydrogen; Multi-electron Atoms; Vector Atom Model.

Books Recommended:

Griffiths, D	Introduction to Quantum Mechanics
Bransden BH, Joachain CJ	Quantum Mechanics
Zettili N	Quantum Mechanics: Concepts and Applications