1.	Title of the course	Introduction to Quantum Technology
2.	Course number	PH514L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Physics
6.	Prerequisite	CoT

7.	**Course Objective(s):** To study the physical implementation of a quantum computer in various architectures. To introduce quantum mechanical tools to analyze quantum devices.

8.	**Course Content:** Quantum mechanical applications: particle in a square well potential, quantum tunneling, atomic transitions, two-level systems; Quantum computation basics: Bloch sphere, superposition, entanglement, quantum bit, entanglement; Physical architecture: neutral atoms, trapped ions, nitrogen-vacancy centers, electron spins, superconducting qubits, nuclear magnetic resonance, optical qubits, topological qubits, circuit quantum electrodynamics; Physical implementations: quantum gates, control, and measurement, single-qubit operations, qubit control with microwave pulses, Rabi oscillations, Ramsey fringes, relaxation times, dynamic reduction of decoherence, spin-echo technique; Applications: quantum key distribution, teleportation, quantum network, quantum sensing, and metrology.

9.	**Textbook(s):** 1. Zagoskin A M, *Quantum Engineering: Theory and Design of Quantum Coherent Structures*, Cambridge University Press (2011). 2. Chen G, Church D A, Englert B-G, Henkel C, Rohwedder B, Scully M O, and Zubair M S, *Quantum Computing Devices: Principles, Designs and Analysis*, Chapman & Hall/CRC (2006).

10.	**Reference(s):** 1. Pohl H A, *Quantum Mechanics for Science and Engineering*, Prentice Hall (1967). 2. Sherwin C W, *Introduction to Quantum Mechanics*, World Public Library (1959). 3. Razeghi M, *Technology of Quantum Devices*, Springer (2010). 4. Girvin S M, *Circuit QED: Superconducting Qubits Coupled to Microwave Photons*, Oxford University Press (2014).