Quantum Mechanics for Quantum Information Science

Course Description: This course provides an introduction to quantum mechanics from the perspective of quantum information science and engineering. Topics covered include: Quantum states and operators; Quantum spin systems; Quantum Eigenstates and Eigenvalues; Expectation values and Quantum measurement; Wave-particle duality; Quantum harmonic oscillators; Quantum dynamics; Schrödinger equation and unitary operators; Schrödinger, Heisenberg and Interaction pictures; Density matrices; Physical implementation of qubits and quantum harmonic oscillators; Introduction to Quantum Entanglement.

Pre-requisites: The course requires an understanding of Linear Algebra and Differential Equations.

Recommended text: Modern Quantum Mechanics by J.J. Sakurai.

Assessment methods: Weekly assignments, one exam (midterm), final project that aims on understanding a quantum application based on the topics covered in the class.

Learning outcomes: The students will have built an understanding of concepts in quantum mechanics from a linear algebra based approach, relevant to quantum information applications.