

Syllabus¹

The course material is drawn from the two texts, *Principles of Quantum Mechanics* (2nd ed.) by Shankar, and *Modern Quantum Mechanics*, 2nd ed., by Sakurai. We will cover these topics in the first semester:

Fundamental Concepts

Stern-Gerlach Experiment
Photon Polarization (material from Baym's *Lectures on Quantum Mechanics*)
Basis Kets & Matrices
Kets, Bras, & Operators
Measurement
Change of Basis
Position, Momentum, & Translation
Wave Functions in Position & Momentum Space

Quantum Dynamics

Time Evolution & SE
Schrodinger & Heisenberg Pictures
Simple Harmonic Oscillator
Schrodinger Wave Equation
Propagators & Feynman Path Integrals
Potentials and Gauge Transformations

Angular Momentum

Rotations & Commutators
Spin $\frac{1}{2}$ and Finite Rotations
SO(3), SU(2), and Euler Rotations
Density Operators
Eigenstates of Angular Momentum
Orbital Angular Momentum
Addition of Angular Momentum
Tensor Operators

¹ As of 02jul2007. Changes will be posted electronically.

Symmetry in QM

Symmetries, Conservation laws, & Degeneracies

Discrete Symmetries

Lattice Translations & Bloch's Theorem

Time-Reversal Symmetry