PHYSICS 6335
Quantum Mechanics
TuTh 12:30 PM-1:45 PM
Dallas Hall Room 142 Fall 2020

INSTRUCTOR Roberto Vega
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OFFICE HOURS By arrangement.

Suggested Texts *Quantum Mechanics* by Eugene Merzbacher, *Modern Quantum Mechanics* by J.J. Sakurai, *Lectures on Quantum Mechanics* by Steven Weinberg, or *Principles of Quantum Mechanics* by R. Shankar *Quantum Mechanics* by Ernest Abers.

GRADING The final course grade will be determined a follows. Homework 50%, exams 50%.

Objectives:

This course is part one of a two semester course focused on a rigorous exposition to the principles of Quantum mechanics. The Dirac bra-ket formalism will be introduced and used throughout to present the principles of Quantum Mechanics in a general context. We will discuss anyalytic solutions to the Schrödinger equation for a variety of potentials in one, two and three dimensions. We will discuss approximations Methods, time independent pertubation theory and time dependent pertubation theory. The role of symmetries as the underlying principle of Quantum Mechanics will be emphasized throughout the course. The use of symmetry principles and operators methods will be discussed.

Learning Outcomes:

Upon completion of this course students shoud able to:

- Use the canonical formalism to quantize a physical system.
- Understand the physical ideas behind the path integral formalism and its relation to the canonical formalism.

- Use the superposition principle to predict experimental outcomes for measurement of observables on simple quantum systems.
- Apply the uncertainty principle and heuristic arguments to obtain rough descriptions of quantum systems.
- Be able to describe generally the physical implications, such as possible bound states and un-bound states for any given hamiltonian.
- Derive the eigenkets of the angular momentum operators and prove properties of completeness and orthogonality.
- Find solutions of the Schroedinger equation for a variety of systems.
- Know to apply time independent and time dependent approximations methods for solutions of the Schrodinger equation.