Stephen F. Austin
STATE UNIVERSITY

PHY 431
Introductory Quantum Mechanics

Course Description

This course provides an introduction to DeBroglie waves, the Schrödinger formulation, step and barrier potentials, perturbation theory, the harmonic oscillator, annihilation and creation operators, commutation relations, representations, vector and matrix mechanics. This course relies heavily on vector calculus, linear vector spaces, and matrices. PHY 431 may be taken for graduate credit.

Course Prerequisite

Modern Physics (PHY 333)

Specific Course Requirements

Textbook Requirements

See current semester textbook list at http://www.physics.sfasu.edu/docs/books.pdf

Course Objectives

- To study the physical applications of quantum mechanics
- To examine the behavior of systems through the application of physical laws and make quantitative judgments of future behavior based upon the boundary conditions which exist
- To develop the facility to solve the wave equation in closed form where possible and, when it is not possible, through the use of perturbation theory as well as other approximate methods

Student Learning Outcomes

By the end of the course, a successful student will be able to:

- Demonstrate a working, quantitative understanding of the quantum phenomena and processes.
- Apply the concepts of quantum mechanics to quantitatively predict behavior of physical systems.

Course Content

Introduction to the concepts of quantum theory and the solutions to selected boundary value problems using Wave Mechanics, Dirac's Vector Space, and various approximation methods when a closed solution is not possible.

Course Assessment

The course assessment may use any or all of the following evaluation tools: exam scores, classroom participation, homework average, quizzes, and team projects.