

DETAILED COURSE DESCRIPTION

Course Number PHYS 411

Course Title Introduction to Quantum Mechanics I

Target audience The course is designed for junior or senior level physics majors; however other engineering and science majors with the correct preparation are very welcome. Nb: this is a course that is mandatory for all Physics Majors. Therefore, this is a course whose audience includes both students who intend to pursue graduate studies, and students who will want to find a job after the BS degree. Topics of choice must take this fact into consideration.

Prerequisites PHYS 250 or PHYS 252 with a C or better, and PHYS 201 or Math 241 with a C or better and PHYS 311 or PHYS 431 with a C or better

Catalog description Fundamental principles of quantum mechanics. The Uncertainty Principle. Solutions of the Schrodinger equation in one dimension. Bound states. Angular momentum. The Hydrogen atom. Required course for all physics majors.

Expected previous knowledge

Concepts wave/particle duality, photoelectric effect, Schrödinger equation, wave functions, simple problems, angular momentum, tunneling, electron spin, Stern-Gerlach experiment.

Skills Familiarity with calculus and calculus concepts (vectors, vector, differential and integral calculus), linear algebra (matrices, determinants etc.), differential equations (ODE).

Course Objectives

To familiarize students with the foundations of quantum mechanics, and the development of formalism and techniques.

Sample Text

“Introduction to quantum mechanics”, David J. Griffiths, Pearson Prentice Hall.

Minimum Material Covered

Historical Introduction

Shrodinger’s equation and the wave function

Schrodinger’s equation in one dimension; bound states and scattering states

The formalism of Quantum Mechanics and the uncertainty principle

Quantum Mechanics in three dimensions and the Hydrogen Atom
Angular Momentum