Credit

3 semester hours

Prerequisites

PHY 301 or Instructor's Consent

Course Description

Schrödinger wave mechanics including application to atomic structure.

Rationale for Course

In general, the study of physics gives students an in-depth understanding of the fundamental principles that govern the physical world around us, and a set of cognitive and technical skills which include thinking analytically, defining and solving problems, and collecting and analyzing and interpreting data. Quantum physics has played an essential role in the development of much of today's modern technology. This course provides students an exposure to the rigor and beauty of modern physics developments and analysis using quantum mechanics and is an advanced investigation of the basic principles of quantum mechanics, applying them principally to atomic structure.

Learning Objectives

- The student will be able to solve the Schrödinger Equation for simple quantum systems such as the square, cubical, and spherical potential wells and the harmonic oscillator potential.
- The student will be able to understand the interpretation of the wave function solutions of Schrödinger's Equation and will be able to calculate expectation values of position, momentum, and energy.
- The student will be able to understand the quantum mechanics of the hydrogen atom and will become proficient in deriving the solution to the Schrödinger Equation for the hydrogen atom.
- The student will understand how to refine their solution to the Schrödinger Equation for the hydrogen atom to account for potential perturbations, relativistic motion, and the presence of internal and external magnetic fields.

Academic Integrity

Students are expected to be honest and to submit their own work on exams and research papers. Adherence to the Mississippi College "Honesty Policy" (2010-2011 Mississippi College Undergraduate Bulletin, pg. 60) will be followed.

Course Outline

- The Schrödinger Equation and Statistical Interpretation
- The Time-Independent Schrödinger Equation
- Quantum Mechanics in Three Dimensions
- Time-Independent Perturbation Theory

Method of Instruction

Class will consist primarily of presenting fundamental physics concepts and working problems. Key points will be highlighted by the choice of problems, and these points will be discussed in the context of the problem.

Required Text

Introduction to Quantum Mechanics, 2nd Edition, by David J. Griffiths

Grading

The final average will be computed as follows: 60% tests/quizzes, 20% homework, 20% final exam. The final exam is comprehensive.

<u>Scale:</u>	Grade	Final Average
	Α	90-100
	В	80-89
	С	70-79
	D	60-69
	F	0-59

Makeup Tests

Makeup tests will be given only under the following circumstances:

- Consent of the instructor has been obtained prior to the test.
- An excused absence is obtained from a doctor or the Vice-President for Academic Affairs.

Absences

Mississippi College policies on attendance and academic integrity will be enforced. Please see the 2010–2011 Mississippi College Undergraduate Bulletin, pg. 56–57 for additional details of these policies. Students are responsible for work missed during an absence.

Special Needs

If you need special accommodations due to learning, physical, psychological or other disabilities, please contact the Counseling and Career Development Center (601–925–3354).