

COURSE SYLLABUS

PHY 4366 – Quantum Mechanics

Credit Hours: 3

Spring 2018

Farrington Building, Room 107

10:00 – 10:50 MWF

Instructor: Dr. Joel W. Walker
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Course Description: This course includes introductory quantum mechanics, application of quantum theory to the harmonic oscillator, potential barriers, the hydrogen atom, theory of atomic spectra, the free electron, and elementary band theory of solids. Prerequisite: PHYS 3391, MATH 3376. Credit 3.

This course is designed to give the student a thorough introduction to the subject of Quantum Mechanics, one of the two pillars (the other being Relativity) 20th century physics. In the early decades of this century, physicists were forced to confront the fact that what we have experienced as “reality” in our common observations is merely an approximation to the more fundamental laws that play the dominant role at sub microscopic distance scales. The atom is not merely a repetition of the motions of our solar system, but instead is governed by a new mechanics wherein quantities such as energy and angular momentum are exchanged only in whole countable (Quantized!) units. All particles were found in certain contexts to reveal their dual wave nature (via interference effects), and even light, known as a wave since the time of Maxwell, was found to behave sometimes as a particle (traded as indivisible units called the “photon”). A proper understanding of these effects revealed the origin of all chemical interactions, and thus also at least in principle, the description of all molecular and material properties. As esoteric and distant as the quantum world may sound, its reality is now an ever-present factor in the engineering of our daily lives, through the advances in semiconductor technology which have been facilitated, leading to the rise of the microprocessor. Even modern medicine is poised to capitalize on the advances in targeted therapies designed at the molecular level, guided by an understanding of behavior within the quantum world. We will attempt at all times that it is possible to convey both the techniques and the intuition or motivation of the subjects under study. The course will be computationally intensive, with a wide variety of assignments made from the required textbook by Griffiths.

Required Textbook:	Introduction to Quantum Mechanics, 2 nd Edition by David J. Griffiths
Required Supplies:	A calculator with trigonometric functions is essential for this course. Graphing calculators are allowed, but not required. In all testing situations, your calculator may be utilized for standard arithmetic and trigonometric computation only. The use of internal memory for storage of notes is strictly and expressly prohibited.
Assignments:	Homework assignments will be given for each chapter covered in the course. Regular, personal application of the concepts encountered is essential to mastery of the required material. Furthermore, these problems will be a valuable insight into what material is considered important by your instructor. Careful completion of all assignments is in itself a critical component of your course average. Moreover, failure to participate will almost certainly damage your exam performance.
Exams:	Three major examinations will be given during the semester (number is subject to reevaluation) in addition to a comprehensive final. If a special situation exists which would cause you to miss an exam, this MUST be made known to me prior to the date of the test if possible.
Grading Plan:	Homework will be worth 20%. The three semester exams together will comprise 60% of your grade. The comprehensive final makes up the last 20% of the full semester average.

Standard University Policies

The following are university-wide official policies which apply to this course. Additional details are available at the web address: <http://www.shsu.edu/syllabus/>

Academic Dishonesty: Students are expected to maintain honesty and integrity in the academic experiences both in and out of the classroom.

Classroom Rules of Conduct: Students are expected to assist in maintaining a classroom environment that is conducive to learning. Students are to treat faculty and students with respect. Students are to turn off all cell phones while in the classroom. Under no circumstances are cell phones or any electronic devices to be used or seen during times of examination. Students may tape record lectures provided they do not disturb other students in the process.

Student Absences on Religious Holy Days: Students are allowed to miss class and other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. Students remain responsible for all work.

Students with Disabilities Policy: It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance should visit with the Office of Services for Students with Disabilities located in the Counseling Center.

Visitors in the Classroom: Only registered students may attend class. Exceptions can be made on a case-by-case basis by the professor. In all cases, visitors must not present a disruption to the class by their attendance. Students wishing to audit a class must apply to do so through the Registrar's Office.