QUANTUM MECHANICS I (PHYS 5301-001)
Fall 2009

Instructor: Igor Volobouev, i.volobouev@ttu.edu
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Office Hours: TTH 14:00 – 15:00, by appointment, and open door
Meetings: TTH 9:30 – 10:50 in SCI 112

Objectives: Understand conceptual foundations of Quantum Mechanics (QM), its postulates, mathematical techniques, and key results. Acquire the ability to solve problems and to comprehend basic QM applications at the research level. Prepare for subsequent self-study of advanced QM material as you need it.

Coverage: Mathematical apparatus of QM (Dirac notation, Hilbert space, linear operators, hermiticity)
QM postulates
Connection between classical mechanics and QM
Problems in 1 dimension (free particle, simple potentials, tunneling, WKB approximation)
Problems in 3 dimensions (harmonic oscillator, hydrogen atom)
Spin, addition of angular momenta

Homework: Problem sets will be assigned on a regular basis and will be discussed in class after the due date. You are welcome to work in small groups. Homeworks will not be collected or graded, but you must understand the problems assigned and be able to work them out: they are an important part of the tests! You must have understood the homework in order to be able to do well on the tests.

Tests: There will be three in-class midterm tests (time TBA) and a comprehensive final exam. The tests will include conceptual and qualitative questions discussed during the lectures and in the book as well as problems picked from the homework (or very similar).

Grading Policy: The following weighting scheme will be used:

10% class participation
60% in-class tests
30% final exam

The following serves as an approximate grade scale:

100-80: A 79-65: B 64-50: C 49-40: D < 40: F

Course Textbook (required): R. Shankar, *Principles of Quantum Mechanics*, 2nd ed., Springer, 1994. This book is not available from the campus bookstore, please order it elsewhere (for example, www.abebooks.com or www.amazon.com).

In order to succeed in this course, you must read the assigned text before coming to lecture. The importance of this can not be overemphasized.

Advanced Textbook (recommended): K. Gottfried and T.-M. Yan, *Quantum Mechanics: Fundamentals*, 2nd ed., Springer, 2004. This book offers wider, in-depth coverage of modern topics (symmetries, density matrix formalism, entanglement, QM interpretation, *etc*). However, the presentation is more abstract and assumes stronger background in physics and math than the Shankar's text.

Feedback: Please let me know what you think about the course. Frequent, honest, and constructive feedback will be highly appreciated. It is the best way to teach your instructor how to teach the course and to enhance your own learning experience.

ADA Statement: Any student who, because of a disability, may require special arrangements in order to meet course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided.