2013 Spring Semester

369 Physics
"Quantum Mechanics I"

Instructor: Prof. Slava V. Rotkin
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610-758-3904; Office: Lewis 414
Class: 9:20 am - 10:35 am TR Lewis 511

Prerequisites: PHY 31 (PHY 362 or equivalent course including introduction in atomic and quantum physics), MATH 205, PHY 215.
Credits: 3
Grades will be based on
- midterm exam (25%),
- homework and quiz (15%)
- textbook reading assignments and class/discussion activity (20%)
- final exam (40%)

Expectations:
You should expect to spend at least an hour of outside class study for every hour in class in addition to approximately an hour doing a homework assignment. Many students find it helpful to form study groups to work and discuss homework assignments with other students which is encouraged. It is an excellent way to learn physics. However, it is expected that finally each student will know how to work his/her problem for quiz, midterm or final without help. If you get stuck on a homework problem, see your instructor for help.
Office hours: TR 1:15 - 2:30 (schedule the meeting)

Textbook: *Quantum Mechanics with Basic Field Theory* by Bipin R. Desai, Cambridge University Press; (2009) #ISBN-10:0521877601 #ISBN-13:978-0521877602 (try to get the latest print, it contains less typo)

Recommended additional reading:
- **L. D. Landau and E. M. Lifshitz, *Quantum Mechanics (Non-Relativistic Theory)***
- J.J. Sakurai: *Modern Quantum Mechanics*, Addison-Wesley (1994)
- A. Messiah, *Quantum Mechanics*
- L. I. Schiff, *Quantum Mechanics*
- **S. Flugge, *Practical Quantum Mechanics*, Springer**
- E. Merzbacher, *Quantum Mechanics*, (3rd edition), Wiley, 1998.
- W. Thirring, *Course in Theoretical Physics 3: Quantum Mechanics of Atoms and Molecules*, Springer-Verlag (1990)
- D. Bohm, *Quantum Mechanics; Foundations and Applications*, 3rd edition, Springer-Verlag (1994)
- Edward L. Wolf, *Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience*, (2nd, Updated and Enlarged Edition). (2006)

This course will be enriched with the elements of the Nanoscience and will include special examples.

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center C212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

Course Syllabus

0. Principles of Quantum Mechanics. Wave functions. Schrödinger equation.

Prelim reading assignment:

Refresh your memories on fundamentals of QM. Introduction in operators, wave functions. Wave packets, free particle motion, experimental observation, Schrödinger equation.

Part I. Introduction: Basic principles of quantum mechanics

1. Basic formalism

2. Fundamental commutator and time evolution of state vectors and operators.

3. Dynamical equations.

Part II. Applications of the formalism of quantum mechanics

4. Free particles. (independent study)

*if time allows