

**Course 606**  
**Quantum Mechanics 1**  
**for graduate students**  
**Fall 2008**

*Instructor Valery Pokrovsky*

1. Historical introduction
2. Wave function. Superposition principle. Uncertainty relation.
3. Schrödinger equation. Solutions of one-dimensional Schrödinger equation.
4. Operators and their algebra. Eigenvalues and eigenfunctions. Operators of physical quantities and measurements.
5. Three-dimensional Schrödinger equation. Conservation of probability. Simple solutions in 3 dimensions.
6. Particle in external electromagnetic field. Gauge invariance. Landau levels.
7. The semiclassical approximation.
8. Variational methods and perturbation theory.
9. Quantum mechanics as an evolution problem in the Hilbert space. Dirac transformation theory.
10. Quantum oscillator revisited. Coherent states. Squeezed states.
11. Angular momentum.
12. Spherically symmetric potential. Kepler problem.
13. Scattering.

The main textbook is E. Merzbacher, Quantum Mechanics, third edition, Wiley. Additional recommended textbooks are: Landau and Lifshitz, Quantum Mechanics, Pergamon or Addison-Wesley; Sakurai, Modern Quantum Mechanics, 2-nd edition, Addison-Wesley.

12 homework assignments will be delivered each tuesday. They are due Wednesday next week. 2 exams are planned: midterm in the middle October and the final exam in December. The grades will be equally distributed between the homeworks and 2 exams. The grade A requires the score more or equal to 90%, the grade B will be given for the score between 80 and 90%, the grade C is between 60 and 80%. Office hours: Tuesday from 11.30 to 12.30 am, Thursday 14.00 to 15.30 or by appointment at the office 416 EPHB. E-mail address: pokrovsky@physics.tamu.edu.