PHYS V 2500 & V 2600: Quantum Mechanics
Fall 2025

Instructor:	Professor V.P. NAIR
Office:	Room J-309 B, Marshak
Office hours:	Wednesdays 2:00 PM to 4:00 PM
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Class Schedule:	10:00 to 11:40 PM, Tuesdays & Thursdays
	Room Marshak 329
Text (recommended):	Mark Beck, *Quantum Mechanics: Theory and Experiment*
	Oxford University Press (2012)
Main resource:	My lecture notes posted on the website

Other recommended books:
Griffiths, D. J., *Introduction to Quantum Mechanics*, Second Edition, Pearson Prentice Hall
Eisberg, R. and Resnick, R., *Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles*, Second Edition, John Wiley and Sons

Catalogue description of the course

Catalogue description of the course Historical foundations. The Schrödinger formulation, wave packets, and uncertainty principle. Harmonic oscillator and potential barrier problems. W.K.B. approximation. Operators and eigenfunctions. Central forces and orbital angular momentum. Scattering, Born approximation, partial waves. Linear vector spaces. The Heisenberg formulation. Spin and total angular momentum. Perturbation theory: bound state, time-dependent. Systems of identical particles. Introduction of relativistic quantum mechanics. V-2500 will cover only the earlier topics given here, V-2600 will complete the set of topics.

Detailed description of topics specific to this term

Difficulties with classical physics; Matter waves; Mathematical introduction (Vector spaces; Fourier series; Cauchy-Scwarz inequality; L2-functions; Diagonalization of matrices and operators; Unitary and hermitian operators; Dirac delta function; postulates of QM; Schrödinger equation; Particles in one dimensions; operators as infinite-dimensional matrices; Linear harmonic oscillator, operator method and differential equation; Free particles; piecewise constant potentials, tunneling; uncertainty principle; con-

servation of probability; Spherical coordinates; general theory of angular momentum; addition of angular momentum; Central potentials; Legendre polynomials; spherical harmonics; Hydrogen atom; spin and magnetic moment of electron; beginnings of many-particle QM.

Variations

I will follow a slightly different sequence starting with the physics which led to quantum mechanics, followed by a mathematical introduction. A set of lecture notes has been posted on the course page, also accessible from my webpage, at
`https://nair.ccny.cuny.edu/V25.html`

Grading

There will be one midterm examination and a final examination. They will contribute to your final grade with weights of approximately 30% and 50%, respectively. These will be *closed book* exams, but I will give you a formula sheet with all the formulae which I consider will be useful for the exam.

Homework

There will be homework assignments, approximately one set for each week. They will be given out in class, and will also be listed on my website. These will be graded, and they do contribute to your final grade with a weight of 20%. It is very important (*for you*) that you do these problems. It has almost always been true that students who do not work out the problems find the exams difficult and end up getting a low grade for the course.

Attendance

Regular attendance is very important. There will be variations in my lectures compared to the book, for this reason, *attendance is important and you should keep good class notes.*

If you are absent for an exam, your grade for that exam will be zero. *There will be no make-up exams, except in dire medical emergencies, supported by a doctor's certificate.*