Quantum Mechanics I

PHY C56 - Winter 2019

Lecture	Tuesday	10:00 am - 12:00 pm	MW 264
Tutorial	Wednesday	10:00 am - 12:00 pm	IC 328

"The more I ponder the physical part of Schrödinger's theory, the more disgusting it appears to me."
Heisenberg commenting on Schrödinger's Wave Mechanics

"If one has to stick to this damned quantum jumping, then I regret ever having been involved in this thing."
Schrödinger commenting on Heinsenberg's Matrix Mechanics

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Office Hours

Wednesday	12:30 pm - 2:30 pm	5:15 pm - 6:15 pm
Thursday	9:30 am - 11:30 am	5:15 pm - 6:15 pm

Course Description and Required Materials

The course will start with a review of key ideas from linear algebra. Using the mathematical tools learned up to this point we will continue by developing the formalism of quantum mechanics in the form of Hilbert spaces and the Dirac notation; observables and the statistical interpretation; and the uncertainty principle. We will then apply this formalism to solve the problem of the hydrogen atom, to extend the classical angular momentum into quantum mechanics, and to introduce the concept of spin. Time permitting, we will study two-particle systems; fermions and bosons; and atomic structure.

By the end of the course you will be able to:

- Identify and define the formal mathematical structure of Quantum Mechanics.
- Apply the fundamental laws and principles of Quantum Mechanics to describe and solve problems of observables with discrete and continuous spectra.
- Analyze the solutions to quantum mechanical problems within the statistical paradigm.
- Explain and illustrate how Quantum Mechanics describes the structure of the hydrogen atom, the spectra of measurements of angular momentum, and the notion of quantum mechanical spin.

Math Prerequisites: Algebra I (MATA23); Vector Calculus II (MATB42); Diff. Equations I (MATB44)
Physics Prerequisites: Intro. to Quantum Physics (PHYB56); Electricity and Magnetism (PHYB21)

Textbook: Introduction to Quantum Mechanics by David J. Griffiths (Cambridge, 2nd Ed.)

The schedule provided at the end of this document indicates the chapters and sections you must read before each lecture. The textbook also provides the conceptual questions and detailed problems that will be the subject of the weekly problem sets, reading quizzes, and tutorial work.

Calculator: A scientific non-programmable calculator is required.

Grading Scheme

Component	Points	Due Date
Tutorial Work	15	Ongoing (Weekly Tutorials)
Test #1	15	Week 5 (Tentative)
Test #2	25	Week 9 (Tentative)
Final Examination	45	Exam Period (April 10 - 27)

e-mail

Absences

In order to ensure fairness in the assessment of all students, there will be no makeup options for practical activities, formal reports, or the tests. In the case of a valid and documented problem that supports an absence to a practical session, the grade will be calculated on the basis of all other submitted work. In the case of a valid and documented problem that supports an absence to the first test, the second test will have its weight increased accordingly. In the case of a valid and documented problem that supports an absence to the second test, the final examination will have its weight increased accordingly. If the problem is health-related you must use the official form available here on the Registrar's Website.

Class Schedule

This schedule is tentative and might change during the term in order to accommodate for variations in the lectures in response to performance and feedback from the students. Some topics might be removable