

Physics 412: Quantum Mechanics II

Requirement: Physics 411 or equivalent.

Topics to be covered:

1. Angular momentum and Spin; Addition of Angular Momenta (and Spin)
2. Charged particle in a Magnetic Field
3. Identical particles (Fermions, Bosons; Examples)
4. Time-independent and Time-dependent perturbation theory
5. Fermi's Golden Rule
6. Variational Principle (Trial Wavefunction)
7. WKB (semi-classical) approximation
8. Adiabatic Approximation
9. Scattering

Other Useful Prerequisites:

Classical Mechanics, Differential Equations, Linear Algebra.

Course Times:

MWF 11-12 in DRL 3C2. (Office hours: Drndic – Monday's 3-4 pm ; additional one hour problem solving session/office hours by TA.

Main Text:

"Introduction to Quantum Mechanics", by Griffiths. Available at the Penn bookstore.

Topics covered are from Chapters: 4, 5, 6, 7, 8, 9, 10, 11, 12.

Supplementary Texts: (*cheap Dover Publishing version available at <http://store.doverpublications.com/>)

"A Modern Approach to Quantum Mechanics", by Townsend. (commonly used undergraduate text)

"Wave Mechanics", by Pauli.* (terse review of QM by one of its creators).

"The Feynman Lectures on Physics: Vol. III", by Feynman. (a must for any serious student of physics)

Additional Reading:

"Sources of Quantum Mechanics", Edited by van der Waerden.* (collection of early papers)

"The Physical Principles of the Quantum Theory", by Heisenberg.* (thoughts from one of the masters)

"Group Theory and Quantum Mechanics", by Weyl.* (classic text)

"Speakable and Unspeakable in Quantum Mechanics", by Bell. (discussion of the "Foundations of QM")

"Quantum Paradoxes", by Aharonov and Rohrlich. (excellent treatment of the "weirdness" of QM)

Web Resources:

"Eric Weisstein's World of Physics" <http://scienceworld.wolfram.com/physics/>

"Wolfram MathWorld" <http://mathworld.wolfram.com/>

Assignments & Grading:

Homework (50%), In-class mid-term exam (20%) – date to be arranged. Final exam (30%).

Homeworks assigned on Wednesdays and due in-class the following Wednesday (unless specified otherwise).

No late homeworks accepted. The lowest homework score will be dropped.