Quantum Mechanics 341

Fall 2010

Text: Quantum Mechanics 2nd Ed., David Griffiths, Prentice Hall

Mr. Joseph L. Powlette CHS 110, 610-861-1438
Powlette@cs.moravian.edu office hours posted

Lecture #	**Topic**	**Readings**
1	Schrödinger's Equation	P.1-9
2.	Separation of Variables & Fourier Transforms	P.24-25,61-67
3.	Dirac Delta Function Spread of Wave Function	Cont.,P.68
4.	Probability Nature Of the Wave Function, Gamma Function	P.9-23
5.	Introduction of Operators	P.26-30
6.	1 Dimensional Applications, Finite Square Well	P.78-80
7.	Cont.	
8.	Graphical Solution To Finite Well	
9.	Barrier Potentials	P.81-84
10.	Alpha Decay	P.322-325
11.	Harmonic Oscillator (H.O.)	P.51-56
12.	Energy Solution	
13.	Hermite Polynomials	P.56-59
14.	Solns. using Hermite Polynomials	Not in Text

15.	Raising & Lowering Operators for H.O.	P.40-51
16.	Postulates of Quantum Mechanics	Not in Text
17.	Hermite Operations & Precise Definition of the Uncertainty Principle	P.96-106,455-457,110-112
18.	Commutators, Separability & Conservation Laws	P.111-118
19.	Linear Vector Spaces Schmidt Orthogonalization Procedure	P.93-96,438-440
20.	Cont.	Not in Text
21.	Matrix Theory	P.441-455
22.	Similarity Transformation	P.447
23.	Matrix Elements in Quantum Mechanics (H.O. again)	Not in Text
24.	Hydrogen Atom	P.131-140
25.	Cont.	
26.	Radial Wave Equation	P.140-152
27.	Energy Solution And Summary	P.152-160
28.	Cont.	
29.	Angular Momentum	P.160-170
30.	Commutation of Angular Momentum Operators	Cont.
31.	Angular Momentum Matrix	Not in Text

32.	Magnetic Moment of Hydrogenic Electrons	Not in Text
33.	Spin	P.171-180
34.	Perturbation Theory (non-degenerate)	P.249-255
35.	Second Order Perturbation	P.255-257
36.	Examples	Not in Text
37.	Sudden Approximation	Not in Text
38.	Free Particle in E and B Field Degenerate Perturbation Theory	P. 257-256
39.	Atoms in External Electric Field	Not in Text
40.	Time Dependent Perturbation Theory	P. 340-354
41.	Fermi's Golden Rule	Cont.
42.	Number 2	

Grades will be determined by 25% laboratory, 50% problems and 25% final exam.
Attendance of lectures is important since new material, problem solutions, different approaches from that of the text and computer instructions will be presented during this time.
Laboratory attendance is required since explanations and procedures will be presented at the beginning of the laboratory period and can not be repeated.

All work on the problem solutions is to be the student's own work and no cooperation with other students is permitted. Help with problems is only available from the instructor.

Goals of the course

At the completion of the course, students should be able to:

- Understand the probabilistic nature of quantum mechanics.
- Use the Schrödinger equation, matrix and algebraic techniques to solve some standard problems of quantum mechanics.
- Understand the nature of a quantum mechanical measurement and the interpretation of the quantum mechanics.
- Appreciate how quantum mechanics has shaped our understanding of the physical world.