Applied Quantum Mechanics - Course Syllabus

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Course Number: MSE 304

Course Title: Applied Quantum Mechanics

Academic Semester:	Summer	**Academic Year:**	2015/ 2016
Semester Start Date:	Jun 05, 2016	**Semester End Date:**	Aug 04,2016

Class Schedule: Tue, Wed, Thu, 9am-11am

Instructor(s) Name(s):	Udo Schwingenschlogl
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Office Location:	B3 R3233
Office Hours:	Thu, 12pm-1pm

COURSE DESCRIPTION FROM PROGRAM GUIDE

Introduction to nonrelativistic quantum mechanics. Summary of classical mechanics and electrodynamics. Postulates of quantum mechanics, wave functions, and operator formalism. Stationary state problems, including quantum wells. Harmonic oscillator. Angular momentum and spin. Atoms, molecules, and band theory of solids. Time evolution, Approximation methods for time-independent as well as time-dependent interactions, including electromagnetism. Scattering theory. Modern applications.

COMPREHENSIVE COURSE DESCRIPTION

Introduction to non-relativistic quantum mechanics. Summary of classical mechanics and electrodynamics. Postulates of quantum mechanics, wave functions, operator formalism and Dirac notation. Stationary state problems, including quantum wells and tunneling. Harmonic oscillator. Time evolution. Approximation methods for time-independent as well as time-dependent interactions.

GOALS AND OBJECTIVES

1: The student will be able to formulate and explain fundamental concepts of quantum mechanics.

2: The student will learn to solve Schrodinger's equation to obtain eigenvectors and energies.

3: The student will learn to calculate and describe the propagation of a particle in a simple, one-dimensional potential.

4: The student will learn to calculate a transition rate by applying perturbation theory.

REQUIRED KNOWLEDGE

Classical mechanics and electrostatics, Fourier transform, Taylor series expansion, basic matrix manipulation, 1st and 2nd order differential equations.

REFERENCE TEXTS

A.F.J. Levi, Applied Quantum Mechanics, Second Edition, Cambridge University Press, ISBN-13 978-0-521-86096-3, ISBN-10 0-521-86096-2

METHOD OF EVALUATION

Graded content
Midterm exam (30%) **Final exam (60%)** **Participation in class (10%)**

COURSE REQUIREMENTS

Assignments

Preparation of text, active participation, revision of class content, exercises

Course Policies

Full participation required.

Additional Information

NOTE
The instructor reserves the right to make changes to this syllabus as necessary.