

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DEPARTMENT OF PHYSICS

PHYS 310 – Quantum Mechanics and Applications I – spring 2021 (202)

Instructor: Abdallah Al Zahrani

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Course Description: Fundamentals of non-relativistic quantum mechanics. Mathematical tools and basic postulates of Quantum Mechanics. The Schrödinger equation and its applications to various one-and three dimensional systems. Spin and identical particle effects. Addition of angular momenta.

Prerequisite: PHYS 213, PHYS 300

Textbook:

1. “Introduction to Quantum Mechanics” by David Griffiths, Cambridge University Press, 2nd edition (2008).

Supplementary references:

1. “Quantum Mechanics: Concepts and Applications” by Nouredine Zettili, Wiley, 2nd edition (2009).
2. “Introductory Quantum Mechanics” by Richard Liboff, Addison-Wesley, 4th edition (2002).

Teaching Method: There will be three online lectures per week. Lecture will start from the first day of the semester. There will be a teaching assistant.

Attendance: Attending all classes is compulsory. A DN grade will be assigned once a student accumulates 10 unexcused absences.

Grading Policy:

Students’ assessment will be based on:

- Classwork and Homework (30%)
- Midterm (30%)
- Final Exam (Comprehensive) (40%)

Week	Day	Date	Sections	Ch.
1	Sun	17 Jan.	The Schrödinger Equation; The Statistical Interpretation	1
	Tue	19	Probability	1
	Thu	21	Normalization; Momentum; The Uncertainty Principle	1
2	Sun	24	Stationary States	2
	Tue	26	The Infinite Square Well	2
	Thu	28	Catch-up	2
Thursday 28 January 2021 – Last day for dropping courses without permanent record				
3	Sun	31	The Harmonic Oscillator	2
	Tue	02 Feb.	The Harmonic Oscillator	2
	Thu	04	The Harmonic Oscillator	2
4	Sun	07	The Free Particle	2
	Tue	09	The Delta-Function Potential	2
	Thu	11	The Delta-Function Potential	2
5	Sun	14	Catch-up	2
	Tue	16	The Finite Square Well	2
	Thu	18	Vectors; Inner Products	Appx.
6	Sun	21	Matrices; Changing Bases	Appx.
	Tue	23	Eigenvectors and Eigenvalues	Appx.
	Thu	25	Hermitian Transformations	Appx.
Sunday 28 February: Last day of dropping course(s) with grade “W” thru KFUPM portal				
7	Sun	28	Catch-up	Appx.
	Tue	01 Mar.	Hilbert Space; Observables	3
	Thu	03	Eigenfunctions of a Hermitian Operator	3
8	Sun	07	Generalized Statistical Interpretation	3
	Tue	09	The Uncertainty Principle	3
	Thu	11	Catch-up	3
Monday 08 March (Tentative!) --- Midterm (Chapters 1, 2 + Appendix)				
9	Sun	14	Vectors and Operators	3
	Tue	16	Vectors and Operators	3
	Thu	18	The Schrödinger Equation in 3D	4
10	Sun	21 Mar.	The Schrödinger Equation in 3D	4
	Tue	23	The Hydrogen Atom	4
	Thu	25	The Hydrogen Atom	4
Thursday 25 March: Last day for withdrawal from all courses with grade of "W" thru the Registrar Office				
11	Sun	28	Catch-up	4
	Tue	30	Angular Momentum	4
	Thu	01 Apr.	Spin	4
12	Sun	04	Spin	4
	Tue	06	Electromagnetic Interactions	4
	Thu	08	Catch-up	4
13	Sun	11	Two-Particle Systems	5
	Tue	13	Two-Particle Systems	5
	Thu	15	Atoms	5
14	Sun	18 Apr.	Atoms	5
	Tue	20	Solids	5
	Thu	22	Solids	5
15	Sun	25	Catch-up	5
	Tue	27	Review	--
	Thu	29	Review	--
Final Exam (Comprehensive with focus on the new chapters.)				

* This lecture schedule is dynamics and subject to modifications.