SYLLABUS PHYS 4310

Quantum Mechanics, Spring 2023

Dr. Yuri Rostovtsev
Office: GAB 525I
Recitation: MW 3:00-3:50 P.M., Phys 115
Email: rost@unt.edu,

Lecture: MWF 10:00 – 10:50 AM
Physics Building Room 311

Phone: 565-3281

Required Text: "**Introduction to Quantum Mechanics**", by David J. Griffiths, 2nd edition.
Office Hours: M 2:00 -3:00 PM and by appointment

Course Content:
Fundamentals of quantum theory; foundations of wave mechanics; Schroedinger's formulation of non-relativistic single-particle quantum mechanics and application to simple systems; Schrödinger equation, one-dimensional problems, operators and eigenfunctions, three-dimensional problems, angular momentum, and spin. Origins of the modern theory of atomic structure; the one electron atom.

We will cover material in Chapters 1-4 and 12 of the book including the wave equation, time-independent Schrodinger equation, linear algebra, Hilbert space formalism, and the EPR paradox.

Note: Not all the material in these chapters will be covered and additional material not in these chapters will be covered.

Exams: Exams are scheduled during class.
Homework: Weekly homework is required to be submitted online.
Make-up: No make-up exams

Grading:

Exam I, Exam II, Exam III	15 %, 15%, 15%
Homework	15 %
Comprehensive final exam	40 %
Bonus problems	
	100%

(A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: less than 60)

The University of North Texas, Department of Physics will make reasonable adjustments to ensure equal opportunity for people with disabilities to participate in all its programs and activities. If special accommodations are required, please see the instructor.

Tentative Lecture and Exam Schedule

Session	Date	Day	Chapter: Lecture Topic
1	18 Jan.	We	Ch. 1: Schrodinger equation
2	20 Jan.	Fr	Ch. 1: Schrodinger equation
3	23 Jan.	Mo	Ch. 1: Expectation values
4	25 Jan.	We	Ch. 1: Hamiltonian
5	27 Jan.	Fr	Ch. 1: Hamiltonian
6	30 Jan.	Mo	Ch. 2: Time-independent Schrodinger equation
7	1 Feb.	We	Ch. 2: Particle in an infinite well
8	3 Feb.	Fr	Ch. 2: Particle in an infinite well
9	6 Feb.	Mo	Ch. 2: Harmonic oscillator
10	8 Feb.	We	Ch. 2: Algebraic solution
11	10 Feb.	Fr	Ch. 2: Raising and lowering operators
XM1	**10 Feb.**	**Exam 1—Chs. 1, 2**	
12	13 Feb.	Mo	Ch. 2: Ground state wave function
13	15 Feb.	We	Ch. 2: Analytic method
14	17 Feb.	Fr	Ch. 2: Free particle
15	20 Feb.	Mo	Ch. 2: Delta function potential
16	22 Feb.	We	Appendix: Vectors
17	24 Feb	Fr	Appendix: Inner products
18	27 Feb.	Mo	Appendix: Matrices
19	1 Mar.	We	Appendix: Changing bases
20	3 Mar.	Fr	Appendix: Eigenvectors and eigenvalues
21	6 Mar.	Mo	Appendix: Hermitian transformations
22	8 Mar.	We	Ch. 3: Hilbert space
23	10 Mar.	Fr	Ch. 3: Hermitian operators
XM2	**10 Mar.**	**Exam 2—Chs. 1, 2, 3**	
—	13 Mar.	Mo	*No class – Spring Break*
—	15 Mar.	We	*No class – Spring Break*
—	17 Mar.	Fr	*No class – Spring Break*
24	20 Mar.	Mo	Ch. 3: Uncertainty principle
25	22 Mar.	We	Ch. 3: Energy-time uncertainty
26	24 Mar.	Fr	Ch. 3: Dirac notation

27	27 Mar.	Mo	Ch. 3:	Dirac notation
28	29 Mar.	We	Ch. 3:	Examples
29	31 Mar.	Fr	Ch. 3:	Examples
30	3 Apr.	Mo	Ch. 3:	Further examples of formalism
31	5 Apr.	We	Ch. 4:	Schrodinger equation in spherical coordinates
32	7 Apr.	Fr	Ch. 4:	Bessel functions
33	10 Apr.	Mo	Ch. 4:	The hydrogen atom
34	12 Apr.	We	Ch. 4:	Spherical Harmonics
35	14 Apr.	Fr	Ch. 4:	Angular momentum
XM3	**14 Apr.**		**Exam 3—Chs. 1, 2, 3, 4**	
36	17 Apr.	Mo	Ch. 4:	Angular Momentum
37	19 Apr.	We	Ch. 4:	Addition of Angular Momentum
38	21 Apr.	Fr	Ch. 4:	Spin
39	24 Apr.	Mo	Ch. 12:	The EPR paradox
40	26 Apr.	We	Ch. 12:	The No-Clone Theorem
41	28 Apr.	Fr	Ch. 12:	The Quantum Zeno paradox
42	1 May	Mo	Ch. 12:	Entanglement
43	3 May	We	Ch. 12:	Quantum computation
FINAL	**6 May**	**Sa**	**Final Exam—Comprehensive (8:00 a.m. – 10:00 a.m.)**	

The University of North Texas is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 – The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

UNT's policy on Academic Dishonesty can be found at:
http://www.vpaa.unt.edu/academic-integrity.htm

Drop information is available in the schedule of classes at:
http://essc.unt.edu/registrar/schedule/scheduleclass.html

NOTICE: SETE (Student Evaluation of Teaching Effectiveness):

The Student Evaluation of Teaching Effectiveness (SETE) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester and will remain open through the week of finals, providing you a chance to comment on how this class is taught. I consider the SETE to be an important part of your participation in this class.