SYLLABUS PHYS 4310

Quantum Mechanics, Spring 2024

Dr. Yuri Rostovtsev
Office: GAB 525I
Recitation: MW 3:00-3:50 P.M., Wh 321
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	17 Jan.	We	Ch. 1: Schrodinger equation
2	19 Jan.	Fr	Ch. 1: Schrodinger equation
3	22 Jan.	Mo	Ch. 1: Expectation values
4	24 Jan.	We	Ch. 1: Hamiltonian
5	26 Jan.	Fr	Ch. 1: Hamiltonian
6	29 Jan.	Mo	Ch. 2: Time-independent Schrodinger equation
7	31 Jan.	We	Ch. 2: Particle in an infinite well
8	2 Feb.	Fr	Ch. 2: Particle in an infinite well
9	5 Feb.	Mo	Ch. 2: Harmonic oscillator
10	7 Feb.	We	Ch. 2: Algebraic solution
11	9 Feb.	Fr	Ch. 2: Raising and lowering operators
XM1	**10 Feb.**	**Exam 1—Chs. 1, 2**	
12	12 Feb.	Mo	Ch. 2: Ground state wave function
13	14 Feb.	We	Ch. 2: Analytic method
14	16 Feb.	Fr	Ch. 2: Free particle
15	19 Feb.	Mo	Ch. 2: Delta function potential
16	21 Feb.	We	Appendix: Vectors
17	23 Feb	Fr	Appendix: Inner products
18	26 Feb.	Mo	Appendix: Matrices
19	28 Feb.	We	Appendix: Changing bases
20	1 Mar.	Fr	Appendix: Eigenvectors and eigenvalues
21	4 Mar.	Mo	Appendix: Hermitian transformations
22	6 Mar.	We	Ch. 3: Hilbert space
23	8 Mar.	Fr	Ch. 3: Hermitian operators
XM2	**10 Mar.**	**Exam 2—Chs. 1, 2, 3**	
—	11 Mar.	Mo	*No class – Spring Break*
—	13 Mar.	We	*No class – Spring Break*
—	15 Mar.	Fr	*No class – Spring Break*
24	18 Mar.	Mo	Ch. 3: Uncertainty principle
25	20 Mar.	We	Ch. 3: Energy-time uncertainty
26	22 Mar.	Fr	Ch. 3: Dirac notation

27	25 Mar.	Mo	Ch. 3:	Dirac notation
28	27 Mar.	We	Ch. 3:	Examples
29	29 Mar.	Fr	Ch. 3:	Examples
30	1 Apr.	Mo	Ch. 3:	Further examples of formalism
31	3 Apr.	We	Ch. 4:	Schrodinger equation in spherical coordinates
32	5 Apr.	Fr	Ch. 4:	Bessel functions
33	8 Apr.	Mo	Ch. 4:	The hydrogen atom
34	10 Apr.	We	Ch. 4:	Spherical Harmonics
35	12 Apr.	Fr	Ch. 4:	Angular momentum
XM3	**14 Apr.**		**Exam 3—Chs. 1, 2, 3, 4**	
36	15 Apr.	Mo	Ch. 4:	Angular Momentum
37	17 Apr.	We	Ch. 4:	Addition of Angular Momentum
38	19 Apr.	Fr	Ch. 4:	Spin
39	22 Apr.	Mo	Ch. 12:	The EPR paradox
40	24 Apr.	We	Ch. 12:	The No-Clone Theorem
41	26 Apr.	Fr	Ch. 12:	The Quantum Zeno paradox
42	29Apr	Mo	Ch. 12:	Entanglement
43	1 May	We	Ch. 12:	Quantum computation
FINAL	**4 May**	**Sa**	**Final Exam—Comprehensive (8:00 a.m. – 10:00 a.m.)**	

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time, however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940.565.4323.
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

The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you on-line at the end of the semester and will provide you with an opportunity to provide feedback to your course instructor. SPOT is considered to be an important part of your participation in this class. In addition to SPOT, there will be a brief in-class course survey during the last two weeks of the semester. **For the Spring 2017 semester you will receive an email in April 2017 from "UNT SPOT Course Evaluations via *IASystem* Notification" (no-reply@iasystem.org) with the survey link. Please look for the email in your UNT email inbox. Simply click on the link and complete your survey.**
After logging in to the my.unt.edu portal, students can access the SPOT survey site by clicking on the SPOT icon. A list of their currently enrolled courses will appear. Students complete each course evaluation independently. During the long terms, the SPOT is open for students to complete two weeks prior to final exams. During the summer terms, the SPOT is open for students to complete six days preceding their final exam. See SPOT Calendar for specific dates and deadlines.