

THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
DEPARTMENT OF PHYSICS

Course #, Title and credits: **20238 PHYS 5361, QUANTUN MECHANICS**, 3 credit hours
Term: Spring 2023
Course Meetings & Location: T R 4:30-5:50 PM Physical Science Bldg Room 222A

Prerequisite Courses: PHYS 4356, course equivalent or consent of the instructor.

Instructor and coordinates: Ramon Ravelo, PSCI 223E, 915-747-5620, rravelo@utep.edu
Office Hrs: Via Blackboard collaborate by appointment. Also, please feel free to email me often with any questions you may have.

Textbook(s), Materials: Required: *Modern Quantum Mechanics*, 3rd Edition, by J. J. Sakurai and J. Napolitano, Cambridge Univ. Press.
Suggested: *Introductory Quantum Mechanics*, by R. L. Liboff, Addison Wesley, 4th Edition, 2003. Other: *Practical Quantum Mechanics* by S. Függe, (Springer Verlag, 1999).

Course Objectives (Learning Outcomes): This course will be devoted to the study of the fundamental principles of Quantum Mechanics. It will emphasize the mathematical formulation of quantum theory to better understand the physics of atoms and molecules. The principal objective is to develop an understanding of basic concepts and mathematical methods and of their relations with one another. Readings and discussions on topics such as representation theory, time evolution of quantum systems, theory of angular momentum, symmetries and conservation laws, identical particles, etc. will serve to reach the proposed goal.

Course Activities/Assignments: Class will be composed of two 80 minutes lectures. There will be weekly homework assignments and in class quizzes. Class notes will be posted weekly.

Assessment of Course Assessment will be through quizzes assignments, two midterms and one final exam which will be comprehensive.

Grading Policy: Grade will be determined based on 2 midterm exams (50%), one final exam (35%) and weekly quizzes (15%).

Make-up Policy: **Exams.** Make up exams are given only on extraordinary cases of severe illnesses or emergencies. In all cases printed documentation will be required and investigated.

Attendance Policy: Attendance is not considered for the grade.

Disability Statement: If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Military Statement: Students being called for military duties need to contact the instructor as soon as possible.

COVID-19 Statement:

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org

Course Schedule

Week	Content		Observations
Jan 17 – 20		Introduction, General Structure of Wave Mechanics	
Jan 24 – 27	Ch 1: § 1.2-1.3	Base Kets, Operators, Matrix representation	
Jan 31 – Feb 3	Ch 1 § 1.4-1.5	Measurements, Observables, Spin	Feb 1: Census day
Feb 6 – 10	Ch 1: § 1.6-1.7	Position, Momentum and Translation operators. Wave Functions in x and p representation.	
Feb 13 – 17	Ch 2: § 2.1-2.2	Quantum Dynamics Schrodinger, Heisenberg Pictures	
Feb 20 – 24		Midterm I, Thursday Feb 23.	
Feb 27 – Mar 3	Ch 2: § 2.4	Time Evolution of Operators and States	
Mar 6 – 10	Ch 2: § 2.6	Propagators Charged particles in a Magnetic field	
Mar 13 – 17		SPRING BREAK NO CLASSES	
Mar 20 – 24	Ch 2: § 2.7	Gauge Invariance Aharonov-Bohm effect	
Mar 27 – 31	Ch 4: § 4.1-4.2	MIDTERM II, Tuesday March 28	Mar 30: Course drop deadline (See academic calendar for further details)

Apr 3 – 7	Ch 3: § 3.5-3.8	Theory of Angular momentum Addition of angular momentum	
Apr 10 – 14	Ch 2: § 2.5.4	Approximation Methods WKB approximation	
Apr 17 – 21	Ch 5: § 5.1-5.2	Time-Independent perturbation theory	
Apr 24 – 28	Ch 5: § 5.3	Fine Structure and Zeeman effect	
May 1 – 5	Ch 5: § 5.5-5.6	Time-dependent perturbation theory	May 5: Dead Day
May 9 - 13		FINAL EXAM (Comprehensive) Tuesday May 9th 4:00-6:45 PM	FINALS