

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

Course #, Title and credits: **16540 PHYS 5361, QUANTUM MECHANICS**, 3 credit hours
Term: Fall 2024
Course Meetings & Location: M W 10:30-11:50 AM Physical Science 224

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: M W 1:00 – 2:00 PM or 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. Topics to be covered include representation theory, time evolution of quantum systems, theory of angular momentum, symmetries and conservation laws and approximate methods.

Course Activities/Assignments: Class will be composed of two 80 minutes lectures. There will be weekly homework assignments and weekly 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 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. For more information about the current rates, testing, and vaccinations, please visit epstrong.org

Course Schedule

Week	Content		Observations
Aug 26 – 30		Introduction, General Structure of Wave Mechanics	
Sep 2 – 6	Ch 1: § 1.2-1.3	Base Kets, Operators, Matrix representation	Sep 2: Labor Day University Closed
Sep 9 – 13	Ch 1 § 1.4-1.5	Measurements, Observables, Spin	Sep 11: Census Day
Sep 16 – 20	Ch 1: § 1.6-1.7	Position, Momentum and Translation operators. Wave Functions in x and p representation.	
Sep 23 – 27		Midterm I, Wed Sep 25	
Sep 30 – Oct 4	Ch 2: § 2.1-2.2	Quantum Dynamics Schrodinger, Heisenberg Pictures	
Oct 7 – 11	Ch 2: § 2.4	Time Evolution of Operators and States	
Oct 14 – 18	Ch 2: § 2.6	Propagators Charged particles in a Magnetic field	
Oct 21 – 25	Ch 2: § 2.7	Gauge Invariance Aharonov-Bohm effect	
Oct 28 – Nov 1	Ch 2: § 2.7	MIDTERM II, Mon Oct 28	Nov 1: Course drop deadline No automatic “W” after this day
Nov 4 – 8	Ch 3: § 3.5-3.8	Theory of Angular momentum Addition of angular momentum	
Nov 11 – 15	Ch 2: § 2.5.4	Approximation Methods WKB approximation	
Nov 18 – 22	Ch 5: § 5.1-5.2	Time-Independent perturbation theory	
Nov 25 – 29	Ch 5: § 5.3	Fine Structure and Zeeman effect	Nov 28-29 Thanksgiving holidays

Dec 2 – 6	Ch 5: § 5.5- 5.6	Time-dependent perturbation theory	Dec 5: Last day of classes Dec 6: dead day
Dec 9 – 13		FINAL EXAM (Comprehensive) Friday Dec 13 10:00 AM – 12:45 PM	FINALS