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

Course #, Title and credits:	PHYS 4356, CRN 21651 **Atoms**, **Molecules and Solids**, 3 credit hours
Term:	Spring 2023
Course Meetings & Location:	T R 9:00-10:20 AM, Physical Science Bldg. Room 222A
Prerequisite Courses:	PHYS 4355 or consent of the instructor.
Instructor and coordinates:	Ramon Ravelo, PSCI 223E, 915-747-5620, rravelo@utep.edu
Office Hours:	Th 2:00 – 3:00 PM or by appointment. Also, please feel free to email me often with any questions you may have.
Textbook(s), Materials:	Required: *Introduction to Quantum Mechanics* by David J Griffiths and Darrel F. Schroeter, 3nd edition (Cambridge Univ Press. 2018).
	Suggested: ***Quantum Physics*** by Stephen Gasiorowicz Website: http://www.wiley.com/college/gasiorowicz Schaum's Outline of *Theory and Problems of Quantum Mechanics* by Yoav Peleg, Reuven Phini, Eliahu Zaarur and Reuven Pnini, (Schaum's Outline Series, McGraw-Hill). It reviews fundamentals and has many solved problems. A more advanced but very good textbook is *Introductory Quantum Mechanics***,** by R. L. Liboff, Addison Wesley, 4th Edition, 2003.
Course Objectives (Learning Outcomes):	This course is a continuation of PHYS 4355, **Introduction to Quantum Mechanics**. It employs the fundamentals developed in that course and applies them to selected applications to quantum theory of atoms, atomic structure, solids and radiation. For more details on topics to be covered, see course schedule below.
Course Activities/Assignments:	Class will be composed of two 80 minutes lectures. There will be weekly homework assignments and in class quizzes.
Assessment of Course Objectives:	Assessment will be through weekly homework and exams.
Grading Policy:	Grade will be determined based on 2 midterm exams (50%), one final exam (30%) and weekly homework (20%).
Make-up Policy:	**Exams**. Make up exams are given only on extraordinary cases of severe illnesses or emergencies.
Attendance Policy:	Attendance is not considered for the final grade.
Academic Integrity Policy:	Any student who commits an act of academic dishonesty is subject to discipline. Proven violations of the detailed regulations, as printed in the Handbook of Operating Procedures, and available on the homepage of the Dean of Students at www.utep.edu/dos, may result in sanctions ranging from disciplinary probation, to a failing grade on the work in question, to a failing grade in the course, to suspension or dismissal, among others.

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 – 21	Quantum Spin	
Jan 23 – 27	Addition of angular momentum	
Jan 30 – Feb 3	Systems of identical particles (Bosons, Fermions). Exchange forces	**Feb 1: Census day**
Feb 7 – 11	Atoms and Solids (free electron gas).	
Feb 14 – 18	Time-independent perturbation theory	.
Feb 21 – 25	**Midterm I, Thursday Feb 23**	
Feb 27 – Mar 3	Degenerate perturbation theory	
Mar 6 – 10	Fine and hyperfine structure of the Hydrogen atom.	
Mar 13 – 17	**SPRING BREAK (No Classes)**	
Mar 20 – 24	Ritz Variational Method: He atom	
Mar 27 – 31	**MIDTERM II, Tuesday March 28**	**Mar 30: Course drop deadline** (See academic calendar for further details)

Apr 3 – 7	Atoms and Molecules: H_2^+ Ion, H_2 molecule	
Apr 10 – 14	SOLIDS	
Apr 17 – 21	Time-dependent perturbation theory	
Apr 24 – 28	Emission and absorption of radiation	
May 1 – 5	. Emission and absorption of radiation	**May 5, Dead Day**
May 8 – 12	**FINAL EXAM TUESDAY May 9 10:00 AM - 12:45 PM**	**Finals**