Quantum Physics

Catalog: The Schrödinger equation; one dimensional systems; the Heisenberg uncertainty principle; magnetic moments and angular momentum; two and three dimensional systems; approximation methods; scattering theory.

Hours: 3 hours (3 lecture/0 lab)

Prerequisites: Modern Physics I (Pre-requisite);
Differential Equations or Calculus III (Co-requisite)

Campus Numberings:

Midwestern State University	PHYS 4353	Texas A&M University-Corpus Christi	PHYS 3490
Prairie View A&M University	PHYS 4023	Texas A&M University-Kingsville	PHYS 4353
Tarleton State University	PHYS 435	Texas Southern University	PHYS 353
Texas A&M University-Commerce	PHYS 420	West Texas A&M University	PHYS 4320

COURSE LEARNING OBJECTIVES:

Course Goals Upon completion of this course, students will	**Assessment**
1. be able to state the four postulates of quantum mechanics.	Embedded Course Assessment
2. be able to recall the relationship between eigenvalues, expectation values, and experimental measurements.	Embedded Course Assessment
3. be able to recall the definitions of introductory quantum mechanical terms such as wave function, eigenstate, stationary state, angular momentum, parity, and compatible observables.	Embedded Course Assessment
4. be able to apply Schrodinger equation to analyze simple 1 -D, 2-D, and 3-D quantum mechanical systems including the particle in a box, finite well, rigid rotator, harmonic oscillator, and the hydrogen atom.	Embedded Course Assessment
5. be able to apply the definition of probability current density and the Schrodinger equation to analyze problems involving one or more 1 -D step	Embedded Course Assessment
6. be able to solve quantum mechanical problems involving the determination of the commutation relation between two operators which represent physical quantities.	Embedded Course Assessment
7. be able to determine if a physical quantity is a constant of the motion.	Embedded Course Assessment
8. be able to analyze simple quantum mechanical systems using approximation techniques including time-independent perturbation analysis.	Embedded Course Assessment
9. be able to calculate the allowed energy and momentum values for a periodic potential using the Kroning-Penney model.	Embedded Course Assessment
10. be able to analyze quantum mechanical problems involving the addition of generalized angular momentum including transforming between the coupled and un-coupled representations.	Embedded Course Assessment
11. know the meaning of basic matrix algebra terms including inverse matrix, Hermitian Adjoint, Transpose matrix, and Symmetric matrix.	Embedded Course Assessment

12. be able to energy, position, and momentum matrix operators for simple systems including the harmonic oscillator and particle in a box and use these operators to solve problems.	Embedded Course Assessment
13. be able to apply approximation techniques including Time-Independent Perturbation Theory and Variational Principle to solve problems.	Embedded Course Assessment