

PHYS4702 Introduction to Atomic, Nuclear, and Particle Physics (Fall 2015)

Class Schedule as of November 24, 2015

Reading assignments from Eisberg & Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles", 2nd Ed (1985)

Day	Date	Topics	Reading	Homework Due
Tue	25 Aug	Classical waves in one spatial dimension; Fourier series and transforms	<i>Notes</i>	_____
Thu	27 Aug	Maxwell's Equations and (electromagnetic) waves in three spatial dimensions	<i>Notes</i>	Assignment #1
Tue	1 Sep	De Broglie waves and Schrödinger's equation; Free particle waves and wave packets	Chap. 3; 5-1, . . . 6	_____
Thu	3 Sep	Energy eigenstates in one spatial dimension; Infinite and finite square wells	5-7; 6-7,8; App.G,H	Assignment #2
Tue	8 Sep	The simple harmonic oscillator (SHO) in one dimension	6-9; Appendix I	_____
Thu	10 Sep	Schrödinger's equation in three spatial dimensions; The box with infinite walls	<i>Notes</i>	Assignment #3
Tue	15 Sep	Schrödinger's equation in three spatial dimensions with spherical symmetry	Appendix M	_____
Thu	17 Sep	One-electron atoms and orbital angular momentum	Chapter 7; App.N	Assignment #4
Tue	22 Sep	The operator formulation of quantum mechanics; The SHO in Dirac notation	<i>Notes</i>	_____
Thu	24 Sep	Spin: Angular momentum in a new kind of vector space	8-1,2,3	Assignment #5
Tue	29 Sep	Spin-orbit interaction, total angular momentum and the energy levels of hydrogen	8-4,5,6	_____
Thu	1 Oct	Time-dependent perturbations, transition rates, and Fermi's Golden Rule	Appendix K	Assignment #6
Thu	6 Oct	Midterm Exam #1 on material through 29 Sep	_____	_____
Thu	8 Oct	Transition rates in atoms and angular momentum selection rules	8-7	Assignment #7
Tue	13 Oct	Multielectron atoms: Ground states and X-rays	Chapter 9	_____
Thu	15 Oct	Multielectron atoms: Optical excitations and Magnetic Fields	Chapter 10; App.P	Assignment #8
Tue	20 Oct	Scattering in the Born Approximation	<i>Notes</i> ; Appendix L	_____
Thu	22 Oct	General properties of atomic nuclei: The liquid drop model	15-1,2,3,4,5	Assignment #9
Tue	27 Oct	Fermions, the Fermi-Dirac distribution, and the Fermi Gas model of nuclei	11-3,4,11; 15-7	_____
Thu	29 Oct	The shell model and collective model of nuclei	15-6,8,9,10	Assignment #10
Tue	3 Nov	Excited states of nuclei, gamma decay, and the Mössbauer Effect	16-5,6,8	_____
Thu	5 Nov	Nuclear beta decay	16-3,4	_____
Tue	10 Nov	Beta decay and the weak interaction	<i>Notes</i> ; 16-4	_____
Thu	12 Nov	Field theory, path integrals, and Feynman diagrams	<i>Notes</i>	Assignment #11
Tue	17 Nov	Leptons and electroweak theory	<i>Notes</i> ; 17-5; 18-6,8	_____
Thu	19 Nov	Midterm Exam #2 on material through 12 Nov	_____	_____
Tue	24 Nov	Fall Break		
Thu	26 Nov	Thanksgiving		
Tue	1 Dec	Hadrons, quarks, and the emerging standard model	<i>Notes</i> ; 17-6; Ch.18	_____
Thu	3 Dec	The Standard Model of Particle Physics; The Higgs boson	<i>Notes</i> ; Ch.18	#12 (Due 8 Dec)