Lahore University of Management Sciences

PHY 201 – Modern Physics

Fall 2012-13

Instructor	Pervez Hoodbhoy
Room No.	
Office Hours	
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Secretary/TA	
TA Office Hours	
Course URL (if any)	

Course Basics				
Credit Hours	4			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	100 minutes
Recitation (per week)	Nbr of Rec (s) Per Week	20 per recitation	Duration	55 minutes
Lab (if any) per week	Nbr of Session(s) Per Week		Duration	
Tutorial (per week)	Nbr of Tut(s) Per Week		Duration	

Course Distribution	
Core	
Elective	
Open for Student Category	
Closed for Student Category	

COURSE DESCRIPTION
An introduction to modern ideas in physics with particular concentration on quantum mechanics.

COURSE PREREQUISITE(S)	
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COURSE OBJECTIVES	
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Learning Outcomes	
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Grading Breakup and Policy
Assignment(s): 10% Home Work: Quiz(s): 2x15%=30% Class Participation: Attendance: Midterm Examination: 25% Project: Final Examination: 35%

Examination Detail	
Midterm Exam	Yes/No: Yes Combine Separate: Duration: Preferred Date: Exam Specifications: crib sheet, both sides
Final Exam	Yes/No: Yes Combine Separate: Duration: Exam Specifications: crib sheet, both sides

COURSE OVERVIEW

Week/ Lecture/ Module	Topics	Recommended Readings	Objectives/ Application
Lectures 1-6	**Einstein's theory of special relativity** Topics: events, space-time, postulates of special relativity, Galilean and Lorentz transformations, time dilation, Lorentz contraction, relativistic addition of velocities, relativistic kinematics, momentum conservation and its applications, Doppler shift and its application to universe's expansion.		
Quiz 1			
Lectures 7-14	**Waves and Particles** Topics: genesis of quantum mechanics, particle nature of light, photoelectric effect, photons, Compton scattering, mathematical description of waves, wavepackets, phase and group velocity, de Broglie relation, double slit experiment, diffraction of electrons by a crystal lattice,		

	Heisenberg's uncertainty principle, stability of hydrogen atom.		
Mid-Term examination			
Lectures 15-22	**Quantum mechanical principles** Topics: concept of wavefunction, operators, eigenvalues and eigenfunctions, time independent and dependent Schrodinger equation, solution for free particle, particle in infinite box, harmonic oscillator, angular momentum, application to hydrogen atom, tunneling, application to alpha-decay, scattering states.		
Quiz 2			
Lectures 23-30	**Quantum mechanical applications** Topics: Dirac bra and ket notation, Schrodinger's cat, photon polarization states, introduction to quantum optics, lasers and ammonia maser, introduction to quantum computers, introduction to nuclear physics. These applications will draw from the theoretical concepts covered earlier in the course.		
Final examination			

Textbook(s)/Supplementary Readings
To be decided. Supplementary materials will be provided from time to time.