بسم الله الرحمن الرحيم

جامعة آل البيت

Faculty of Science
Department of Physics

Waves and Oscillations 0402222

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First semester 2014/2015

Lecture	Subject	Week
1	**Simple harmonic motion**	I
2	Simple harmonic oscillator behavior	
3	Phase angle, displacement, velocity, acceleration	
4	Energy of simple harmonic oscillator	II
5	Superposition of two SHMs	
6	Superposition of two SHMs by vector addition	
7	Applications:	III
8	Damped motion of mechanical and electrical oscillators	
9	Heavy and critical damping	
10	Amplitude decay	IV
11	Logarithmic decrement	
12	Relaxation time	
13	Quality factor	V
14	Rate of energy decay	
15	Applications	
First Exam (Sun. 26.10.2014)		
16	**The forced oscillator**	VI
17	Transient behavior of a forced oscillator	
18	Steady state behavior of a forced oscillator	
19	Variation of displacement and velocity with frequency of driving force	VII
20	Power supplied to oscillator	
21	Q-value and its important	
22	Applications	VIII
23	**Coupled oscillations**	

24	Spring coupled pendulums	
25	Normal coordinates and normal modes of vibration	IX
26	Coupling of many oscillators on a loaded string	
27	Wave motion as the limit of coupled oscillations	
28	Applications	X
29	**Transverse wave motion**	
30	Particle and phase velocities	
Second Exam (Sun. 04.12.2014)		
31	Transverse waves on a string	XI
32	Reflection and transmission of transverse waves at a boundary	
33	Standing waves on a string of fixed length	
34	Normal modes and eigenfrequencies	XII
35	Wave groups, group velocity	
36	Transverse waves in a periodic structure (crystal)	
37	Applications	XIII
38	**Longitudinal waves**	
39	Sound waves in gases	
40	Energy distribution in sound waves	XIV
41	Intensity of sound waves	
42	Reflection and transmission of sound waves at a boundary	
43	Applications	XV
44	**Electromagnetic waves**	
45	Wave equations for electric and magnetic field vectors	
46	Poynting vector	XVI
47	Energy density of electromagnetic waves	
48	Electromagnetic waves in a conductor	
Final Exam		

Core Text

Pain H.J., *The Physics of Vibrations and Waves* (4th edition), Wiley,1993.

Supplementary Text(s)

Young H.D. and Freedman R.A. (2000), *University Physics (with Modern Physics)* (10th edition), Addison-Wesley.