16FA_PHY_211_A Vibrations, Waves, and Optics

Schedule

Physics 2016 Schedule

Week Beginning	Monday	Tuesday (Lab Day)	Wednesday	Friday
22-Aug				14.1 Simple Harmonic Motion (SHM) Position, velocity and acceleration simulation (click on "Motion Graphs" in Harmonic Motion in left column)
29-Aug	14.1 Simple Harmonic Motion and Circular Motion SHM and circular motion simulation (On pull-down Applet menu click on oscillations, then simple harmonic motion) 14.2 Energy in SHM Concept Problems 14:6,8,10,12	0: Introduction to Mathematica	14.3 Some Oscillator Systems Pendulum simulation (click on pendulum at large amplitude) Problems: 14.32,36,46,48	14.4 Damped Oscillations Energy in damped oscillation (On pull-down Applet menu click on oscillations, then spring mass oscillations) Damped harmonic motion simulation (click on "Damped harmonic motion")
5-Sept	14.5 Driven Oscillations and Resonance Driven harmonic motion simulation 1 (click on "Driven harmonic motion") Driven oscillation simulation 2 Concept Problems 14.16,18,20	Exp.1 Simple Pendulum, Small/Large Amplitude	14.5 Driven Oscillations and Resonance (continued) Driven damped simulation 1 Problems: 14.54,70,80,86	14.5 Mathematical treatment of resonance
12-Sept	Homework problem solving Concept Problems: 14:22,24,28	Exp. 2 Physical Pendulum, Damping	15.1 Simple Wave motion Mathematica wave pulse Wave simulation (Click on "Transverse and	The Wave Equation 15.2 Periodic Waves Mathematica Periodic Wave

			longitudinal waves" and "How a wave propagates") Problems: 14.105(d,e),106	
19-Sept	15.3 Waves in 3D, Speed of Sound (p. 618) Sound simulation (Click on pressure versus displacement) Concept Problems: 15:2,6,8,24	Exp. 3: Damped, Driven Oscillator, Resonance	15.1-3 Energy transport and wave intensity Problems: 15.30,36,40,42	15.4 Waves Encountering Barriers 15.5 Doppler Effect Wave reflection simulation ((Go to Animnation menu on upper left and choose Waves->Transverse Waves->Transmission and Reflection) Doppler effect simulation (Go to Animation Menu, Wave motion, and choose Doppler Effect)
26-Sept	16.1 Superposition of Waves Superposition simulation (Click on "Superposition")	Exp. 4 Speed of Sound in Air	Test 1 Chapters 14-15 Problems (Due Oct 3): 15.70,81,88	16.2 Standing Waves Standing waves simulation (Click on "Standing waves") Beat simulation
3-Oct	16.3 Superposition of Standing Waves (pp. 550-551) Flutes versus clarinets simulation Clarinet versus trumpet simulation Problems (Due Oct 10): 16.6,12,24,44	Exp. 5 Vibrations of a String	16.3 Harmonic Analysis & Synthesis, Wave Packets & Dispersion (pp. 551-554) Fourier analysis (Click on Fourier analysis) Phase versus group velocity simulation	Fall Break
10-Oct	30.1-2 Maxwell's Displacement Current Mechanical Universe Chapter 39: Maxwell's Equations	Exp. 6 Resonant Air Column	30.3 Wave Equation for EM Waves Mechanical Universe Chapter 39: Maxwell's Equations CircPol.swf Problems: 16.52,66	30.4 Electromagnetic Radiation Mechanical Universe Chapter 39:Maxwell's Equations

			30.4,18	
17-Oct	31.1-2 Speed of light, Propagation of Light Speed of light video Huygen's principle simulation Mechanical Universe Chapter 40: Optics		31.3 Reflection and Refraction Physics of rainbow simulation 1 Physics of rainbow simulation 2 Problems: 30.6,36,46 31.36,42	31.4 Polarization Malus' law and polarization on reflection simulations
24-Oct	**Test 2** **Sections 15.5, 16.1-3, Chap 30, 31.1-3**	Exp. 7: Total Internal Reflection	Derivation of the laws of reflection and refraction Problems: 31.10,52,56	31.6-8 Wave-Particle Duality, Light Spectra, Sources of Light, Lasers Spectroscopy simulation
31-Oct	32.1 Mirrors Mirror simulation (Click on "Plane Mirror") Optics bench simulation	Exp. 8 Polarization of EM Waves	32.1 More Mirrors Problems:31.68 32.24(a,d),25	32.2 Lenses
7-Nov	32.3-4 Aberrations, Optical Instruments Human eye simulation Microscope and Telescope (Play with Optics Bench simulation) Problems: 32.8,12,46,54	Exp. 9 Geometrical Optics - Mirrors and Lenses	33.1-3 Phase Differences, Interference Mechanical Universe Chapter 40: Optics Double slit interference simulation (Click on "Double-slit interference) Thin film interference simulation (Click on "Thin-film interference") Problems:33.6,24,34	**Guest Lecture**
14-Nov	33.4 Diffraction 33.5 Using Phasors to Add Harmonic Waves phasor application	Exp. 10 Interference and Diffraction	33.6 Fraunhofer/Fresnel Diffraction	Test 3 Sections 31.4-8, Chapter 32,, Sections 33.1-4
28-Nov	Holograms **Joeng article on holograms**	Exp. 11 Recording a Reflection Hologram	33.7-8 Diffraction & Resolution	**Review**
10-Dec	Review			

Final Exam: Tues. 12/6, 9-11 am

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